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McKIM, MEAD & WHITE—A HISTORY

BY LIONEL MOSES

IN 1872 Charles Follen McKim entered upon the practice of architecture in New York City. He had been a student at Harvard, had studied at the Ecole des Beaux Arts and had spent two years in the office of Gambrill and Richardson. In 1878 McKim formed a partnership with William Rutherford Mead and Wm. B. Bigelow, the latter retiring from the firm during the following year.

Mead had been graduated from Amherst in 1867, had spent several years in Russell Sturgis' office, had studied a year in Florence at the Accademia delle Belle Arti, and had traveled extensively.

In 1879 Stanford White, a New York University man who, too, had been in Gambrill and Richardson's office at the same time as McKim, after an extensive trip through Europe, joined the others, and the firm of McKim, Mead and White came into being.

From the very beginning of this partnership the work of the firm revealed a quality of architectural design different from and far superior to that which then prevailed, and in due time the firm became noted among the foremost of the architects of the day, taking rank beside a limited number of others whose work showed a high degree of talent, and who had already been in practice for some time.

The American Academy in Rome (1913)

It must not be thought, however, that recognition came suddenly. In the beginning the firm experienced difficulties and discouragements similar to, but even greater than, those that exist at the present time. But with minds ever set on highest principles of service and art, recognition was bound to come. When once it commenced it grew steadily until, throughout the art world, both here and abroad, McKim, Mead and White became famous, and the buildings designed by them were admired and publicly praised for their architectural beauty. They were hailed not only as great artists but also as pioneers. As building after building was erected, the public became better educated in architecture and evinced a growing desire for beautiful edifices.

Were appreciation of Charles F. McKim, William Rutherford Mead and Stanford White to end with the expression of admiration of their buildings, and praise of their successful blazing of the trail leading to the development of popular taste, their fame would still be secure; but they were more than great designers and public educators. Their early experiences; their love for the beautiful; their passion for good architecture; all caused them to look far into the future even at the time that they were at the pinnacle of success. Those who were intimately connected with them at this time fully know to what extent they

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did look forward and with what devotion they laid the foundation for the future of the art of architecture in this country. Those whose good fortune it was to be so connected, realize that these men were always teaching, helping and encouraging all who were in their office in order that, when they should go forth as practitioners, they might uphold the standards of the profession as these standards should be upheld.

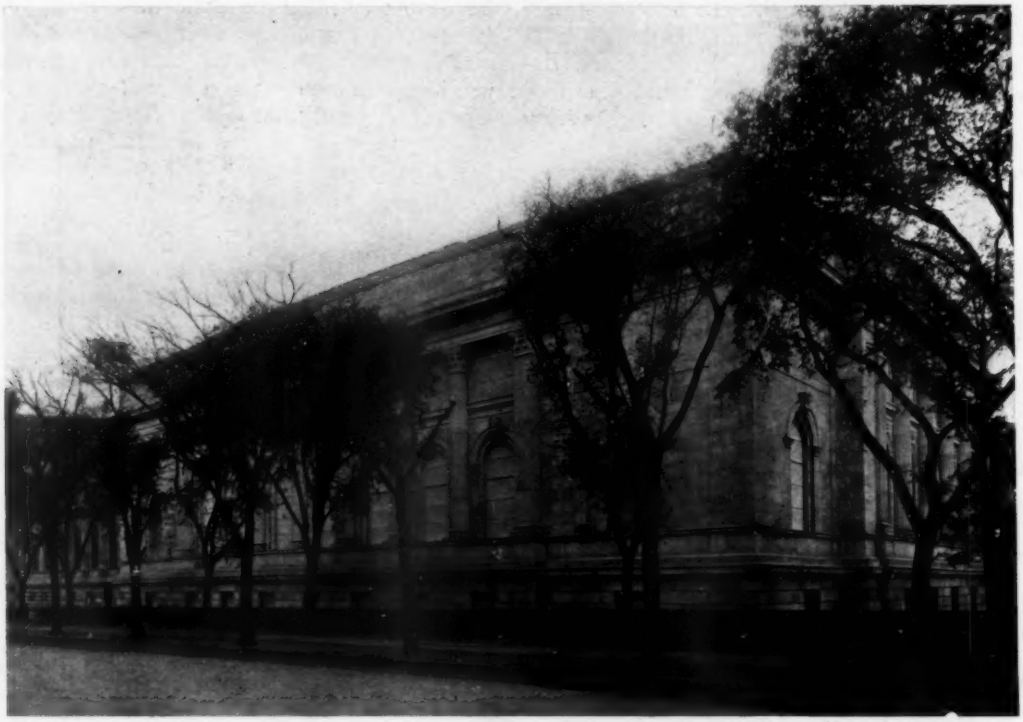
By this attitude toward art, public and student, the firm became more than a mere office. It became an institution, just as truly as though "College" or "University" had been appended to the firm name.*

But there is an additional proof of the truth of the assertion that the firm, McKim, Mead & White was, in character, an institution and that its members were cognizant of the fact. It is found in their determination to perpetuate the name and continue the activities that had brought this name into such high repute. Thus, at the height of their attainments, they commenced to consider who should, in the future, be their successors. These men must have the same lofty aims and high business principles that they themselves had. They must be men of proven ability.

It was but natural that the selections should be the very men who, in increasing measure, year by year, had contributed a vital influence to the work of the office. As a matter of fact, the work of the men later to be selected had already blended completely with that of the others. Internal changes had taken place without the slightest jar, transition having been so gradual.

When, however, announcement was made of the additions to the personnel of the firm, the world of art was interested. This interest partook of various forms. With these we need not now be concerned. It is sufficient merely to note the fact since time has proven the wisdom of the selections made.

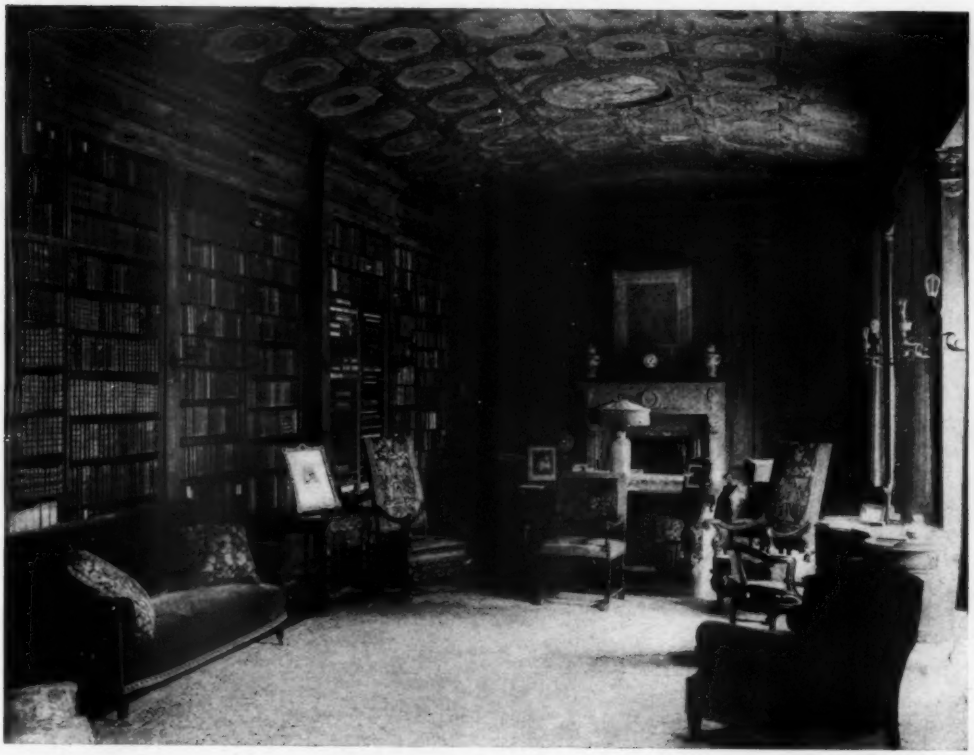
On January 1, 1906, William Mitchell Kendall, Burt Leslie Fenner and William Symmes Richardson were made partners, followed by Teunis J. Van der Bent and later by Lawrence Grant White.

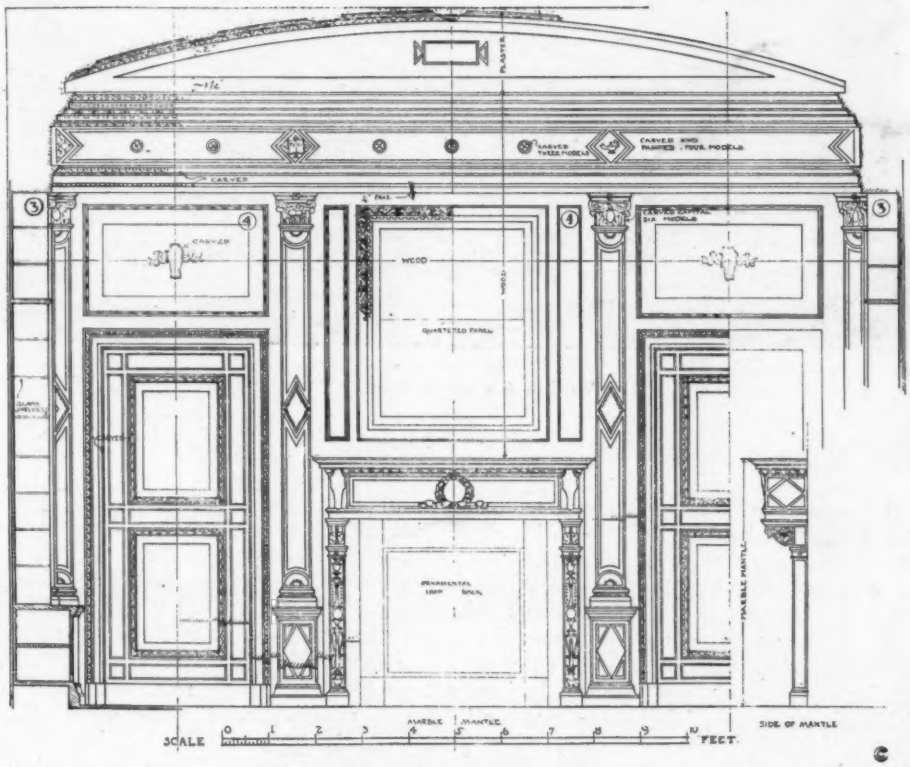


Addition "H"—Metropolitan Museum of Art

Kendall had been graduated from Harvard in 1876, had traveled abroad and been connected with the firm since 1882. His intimacy with the original partners and the complete artistic harmony in which he and they had worked together for so many years; the design knowledge which Kendall had contributed during the firm's formative period, and after; these and other assets made

*See appended list of names of some of those who have been members of the office.





Library for the Hon. Whitelaw Reid, New York (1910)

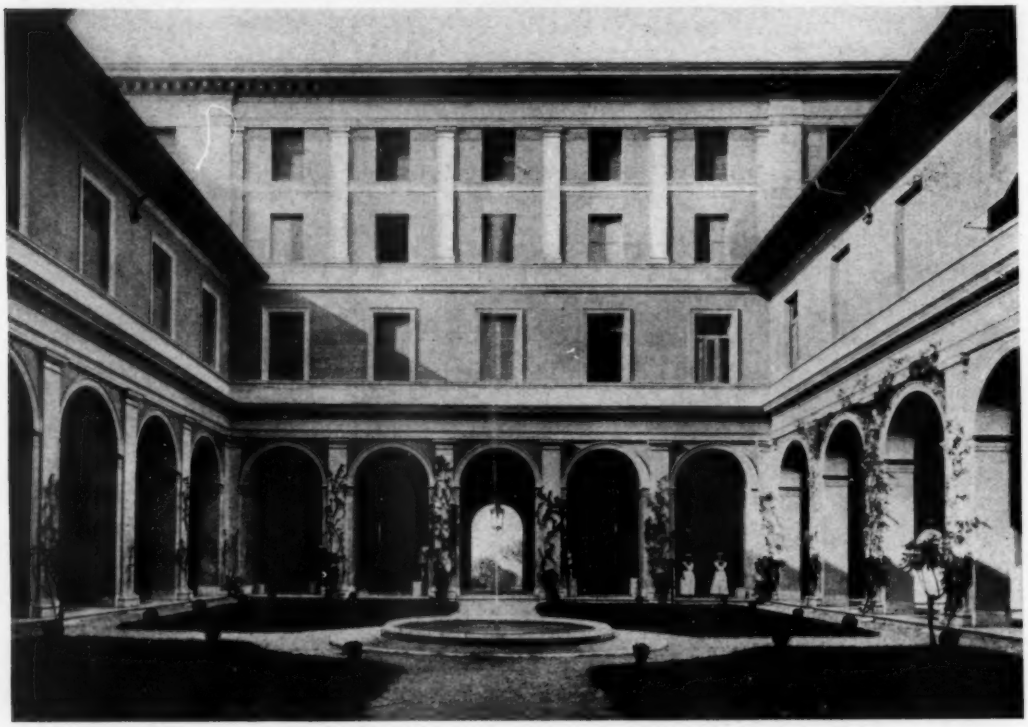
it as logical for him to become a partner as it is for brother to join brother.

Fenner had been a student at the University of Rochester and the Massachusetts Institute of Technology from 1887 to 1891, and had entered the office in the fall of 1891. Fenner's father and Mead had been classmates and close friends at Amherst. What, then, more natural than that Fenner, in the pursuit of his profession, should enter the office of McKim, Mead and White? What more natural than that Mead should take a paternal interest in him and that he should impart to him knowledge which had contributed so markedly to the success of the firm; that under McKim and White, Fenner should develop further knowledge of design already gained by his studies at Technology? The younger man soon proved his ability to shoulder the burden of labor of which the older one gradually divested himself.

Richardson had come from practice in San Francisco and had been in the office since 1895, during which period he had gained the confidence of White who, more and more, entrusted him with important work and continually counseled with him on matters of design. How natural, therefore, that he, too, should become a member of the enlarged firm.

Van der Bent had been graduated from the University of Delft, Holland, in 1885 as an architect-engineer, and had entered the office in 1887. During the time he had been so connected he had contributed great engineering skill. Not alone this; his knowledge of general construction, of planning, of superintending and of designing as well, made him a valued co-worker and a very great asset to the firm at the time of its expansion.

Lawrence Grant White, Stanford White's son, by his very inheritance, was cast for architecture. Under the guidance of his father, even in his early youth, his leaning was unmistakably toward that profession. Graduated from Harvard in 1907, he completed the Ecole des Beaux Arts course, and in 1914 entered the office and was made a member of the firm in 1920.



The American Academy in Rome (1913)

While much of the work done before the expansion of the firm might be properly credited, at least in part, to these men, the work for which Mr. Mead and they are entirely responsible, dates from 1909, when McKim died, White's death ante-dating McKim's by three years.

For several years prior to 1919, Mr. Mead had been gradually transferring his labors to his partners. He had, during that period, as before, been the steadying influence. At the end of 1919 he retired from the firm, still maintaining, however, his interest as consultant and adviser.

And so today the firm of McKim, Mead & White is composed of William Mitchell Kendall, Burt Leslie Fenner, William Symmes Richardson, Teunis J. Van der Bent and Lawrence Grant White, with Mr. Mead as consultant.

The first noteworthy attainments of the new firm were the Municipal Building at Park Row and Chambers Street and the United States Post Office opposite the Pennsylvania Terminal, both won in competition. The Terminal itself had been a subject of preliminary study during the life of both McKim and White. The construction contract was awarded in 1906 and the building was erected under the supervision of the expanded

SALON
House of Percy Pyne, Esq., New York (1911)

firm. Thus in a comparatively short time the firm showed unmistakably its capability of perpetuating the great name as well as the fame of the firm as originally constituted; then and later proving the wisdom of the original members in their choice of men that were to succeed them.

And what of subsequent work? When we recall some of the earlier work, we are impressed by the classic tendency that pervades most of the designs. So are we impressed when we study an equal number of the best buildings designed after 1909.

Comparison between the two periods reveals little to allow of differentiation. The same scholarly knowledge is evident. The same dignity of design is appreciable. The same conception of scale and proportion is discernible. And we note the same refinement of detail. Instinctively it occurs to one's mind that the same artistic impulses are at work now as at the previous period; that the same spirit of art still exists. No break in continuity is evident between what was and what is. McKim, Mead and White still lives.

Classic influences have always prevailed in the work of this firm. Each example of it is a noteworthy expression of these influences, yet if we study some of the individual buildings designed in other styles we are impressed by the same scholarly understanding which is shown here, also. The Redmond houses are an example. The problem of designing a residence in the French style of Henry II, at the corner of two streets in a great city is fraught with many difficulties. These difficulties are not always apparent after designing has been completed. In fact the finished building should not show them at all. Nor does it in the case in question. (How many, for example, have observed the unequal spacing of windows?)

The net result is an edifice simple in character, well proportioned and dignified, attesting in every part studious care supported by full understanding of the *motifs* of the period of Henry II.

Another case is that of the Newbold house.

Compare this house with any of similar style (and there are many in the city) and we cannot help noting how well the natural difficulties have been overcome or, if few are recognized in the completed work it is because the result is so eminently satisfactory.

The same general remarks are applicable to the Pyne house which is a noteworthy building among Georgian residences of modern erection.

Municipal Building

The difficulties of satisfactory solution of the problems involved in the planning of the Municipal Building are best known to those architects who competed for the work.

A comparatively small plot of irregular shape on which was to be erected a very high office building, whose rooms required proper lighting; a building whose principal story would allow of uninterrupted passage of the traffic of Chambers Street, as well as access to subways; a towering building without cellar for the numerous necessary mechanical contrivances of an office building —these and other requirements faced the competitors.

That all these problems are satisfactorily solved is evident, and we have a building of 580 feet to the top of the figure, of superbly monumental character and classic beauty, every part of which attests the architectural knowledge of its designers.

U. S. Post Office Building

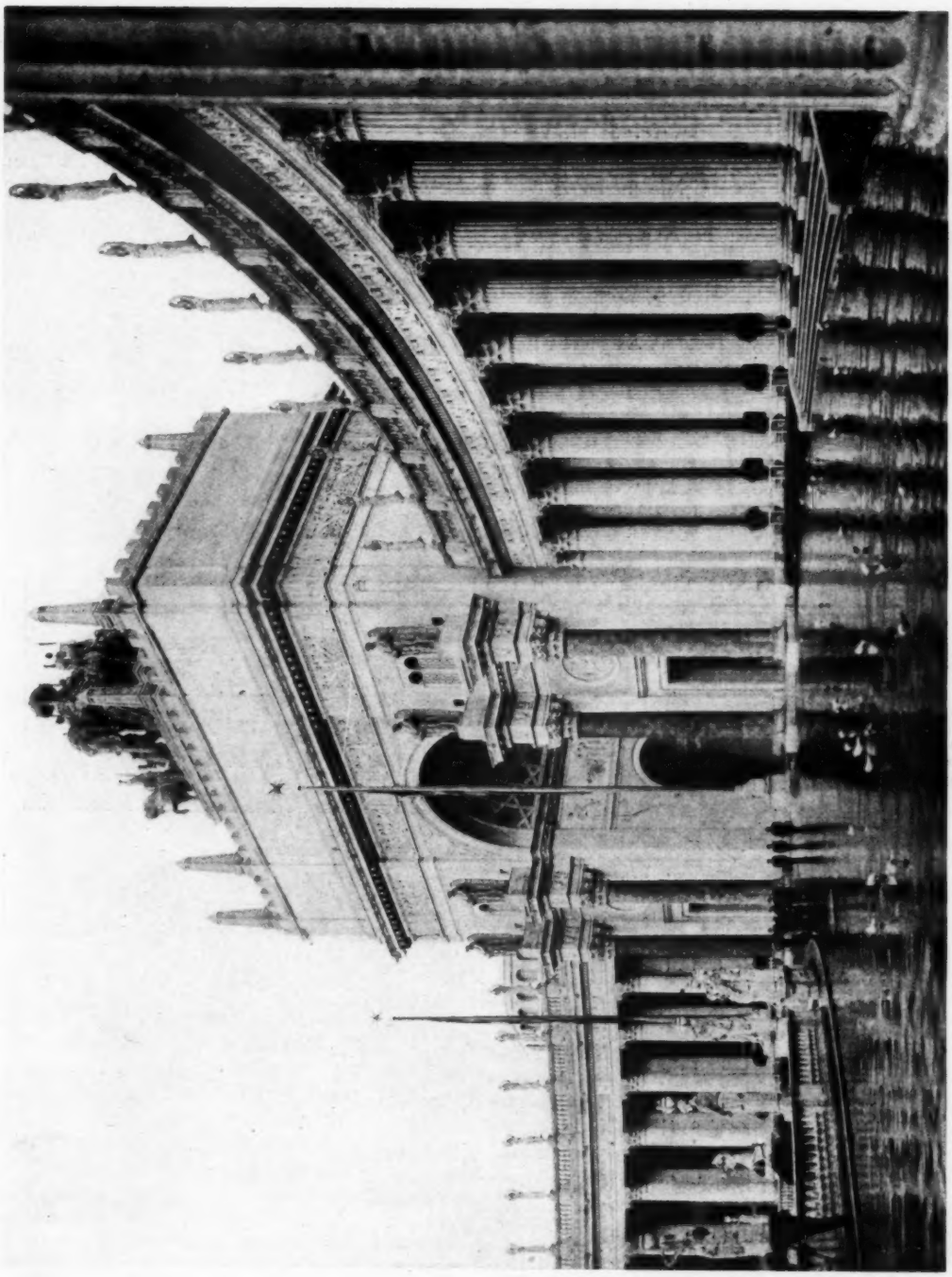
Unless a building of moderate height is large in scale it becomes insignificant when surrounded by skyscrapers. The design of a building, therefore, of any considerable size which is likely to be so surrounded, should be conceived with this important point in view, and its details executed so as to preserve the scale of the conception and a unity of design.

Had the Pennsylvania Terminal been less noble in its proportions, it would be dwarfed by the hotel which towers above it on the opposite side of Seventh Avenue.

What the future has in store for the surroundings of the Post Office Building which faces the Eighth Avenue front of the Terminal, no one knows, but we may rest satisfied that no matter what may be built in proximity, the Post Office, by reason of its noble scale, will always retain the monumental character which should be distinctly associated with the governmental class of buildings.

Harmony, too, with the design of the western facade of the Terminal Building, is one of the essentially successful qualities of this building, the two forming a "center" with which no spot in the city can be compared, the nearest approach to

RECEPTION ROOM
House of Percy Pyne, Esq., New York (1911)



VIEW IN COURT OF THE UNIVERSE, PANAMA PACIFIC INTERNATIONAL EXPOSITION (1915)
McKIM, MEAD & WHITE, ARCHITECTS

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comparison being the Seventh Avenue front of the Terminal taken in conjunction with the Pennsylvania Hotel.

A study of the plan of the Post Office is well worth while for by it we note its exact expression in the elevations.

Pennsylvania Hotel

It is a far cry from the hotels erected a quarter of a century ago to the one completed in 1920 opposite the Pennsylvania Terminal. One notes now how tiresome is the over ornate decoration which was conceived, in former years, as being a hotel necessity; a character without which popular favor could not be obtained, and therefore financial success assured. Little by little the fallaciousness of the idea has become apparent until hotels (as well as residences and, for that matter, buildings generally) become distinguished by reason of their quiet good taste rather than by their elaborateness.

The design problem of the Pennsylvania Hotel may not have been one of extreme complexity but the opportunities it afforded have been used to advantage and the design of the public rooms of this hostelry are well worthy of being taken as standards for other hotels of similar character and moreover it is not unlikely that they will be. The design and arrangement of the mechanical contrivances are worthy of special note. They marked a great step forward in hotel efficiency and have already been used as standards for some of the hotels subsequently erected.

McKinley Memorial

An appreciation of the McKinley Memorial at Niles, Ohio, requires that attention be drawn to its plan which, for a problem of this kind, is unique. We have here, instead of one important room over another, a library and an auditorium on the same level joined by a colonnade and separated by a Court of Honor, or Atrium, surrounded by a peristyle in the center of which is the statue.

Of the architecture of the edifice little need be specially noted, one cannot help admiring those qualities shown here which seem to be prevalent in McKim, Mead and White's work.

FAÇADE TOWARDS GARDEN

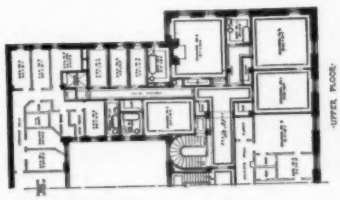
Botanical Museum of the Brooklyn Institute of Arts and Sciences

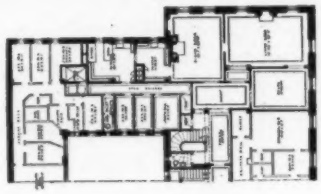
Apartment House 998 Fifth Avenue

McKim, Mead and White have repeatedly initiated new eras of architectural design and opened the markets for new materials. One can recall the first modern use of the black headed arch brick and the unevenly shaped brick which were at one time "wasters" of the kiln. These were used in the Harvard Gates by Mr. McKim and to this day are known as "Harvard" brick. Almost immediately after the Harvard Gates became known, architects everywhere made use of this kind of brick. So, too, with light colored brick used first in an apartment house (The Yosemite at 62nd Street and Park Avenue). No sooner was this building completed than here and there, through the city, their use became common.

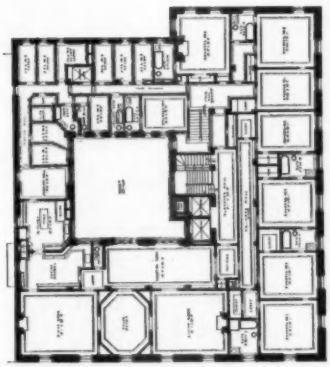
As has been stated, the firm was ever pioneer-

(Concluded on page 424)

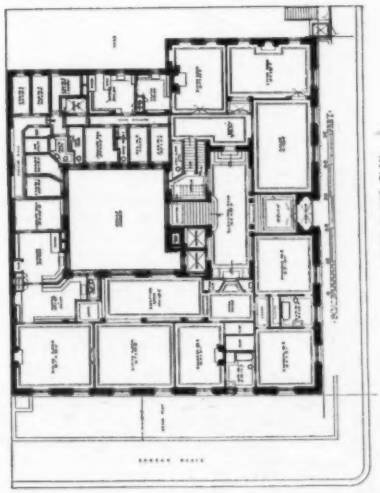




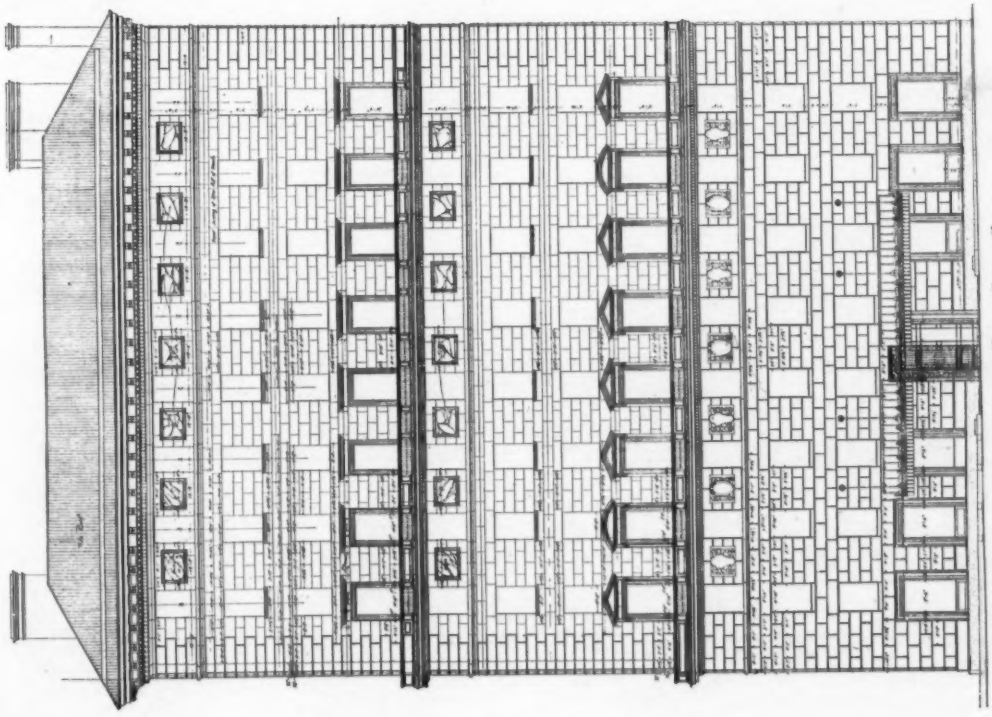
TYPICAL DUPLEX APARTMENT



TYPICAL UPPER FLOOR PLAN SHOWING SINGLE APARTMENT ON LEFT AND PART OF DUPLEX ON RIGHT



FIRST FLOOR PLAN



APARTMENT HOUSE, 998 FIFTH AVENUE, FOR THE CENTURY HOLDING CO.
1911

ELEVATION

McKIM, MEAD & WHITE, ARCHITECTS (1911)

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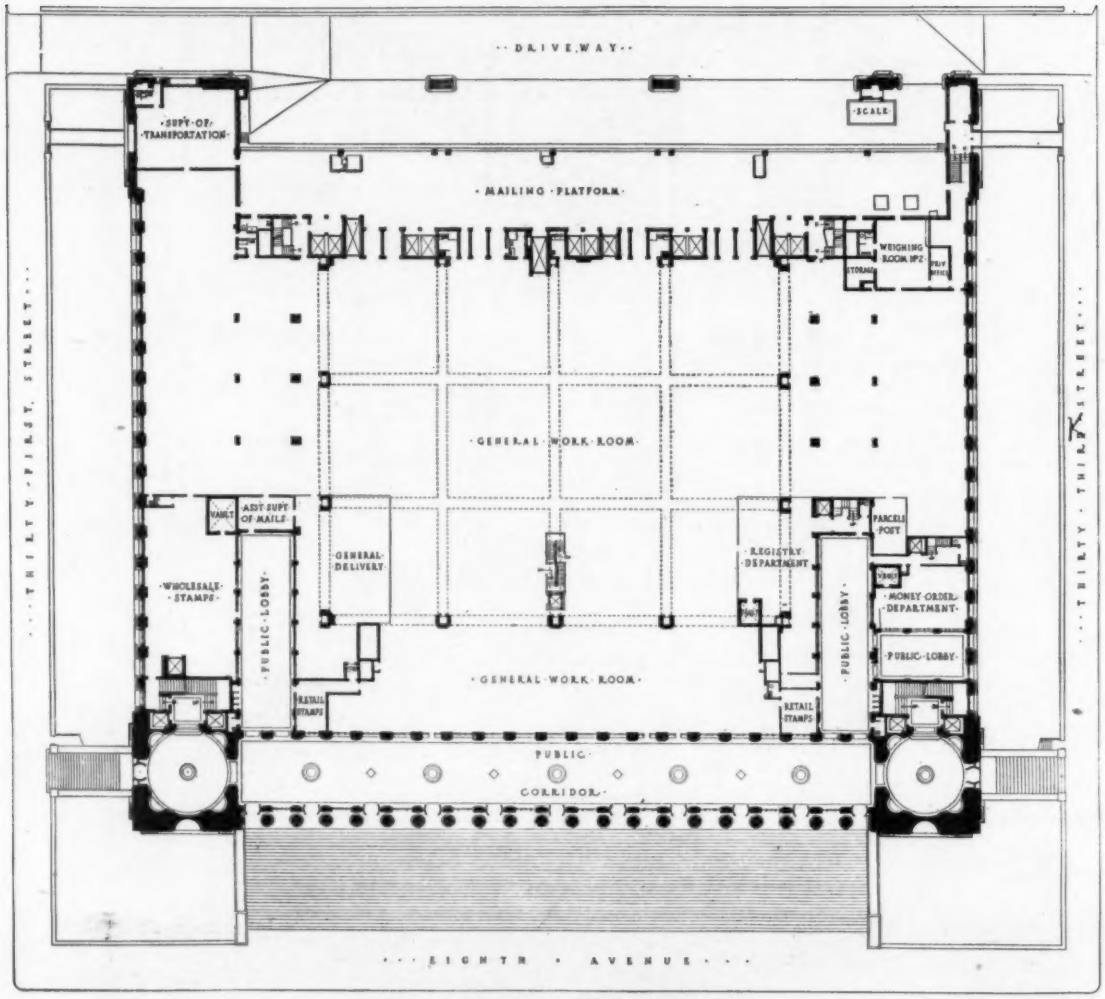
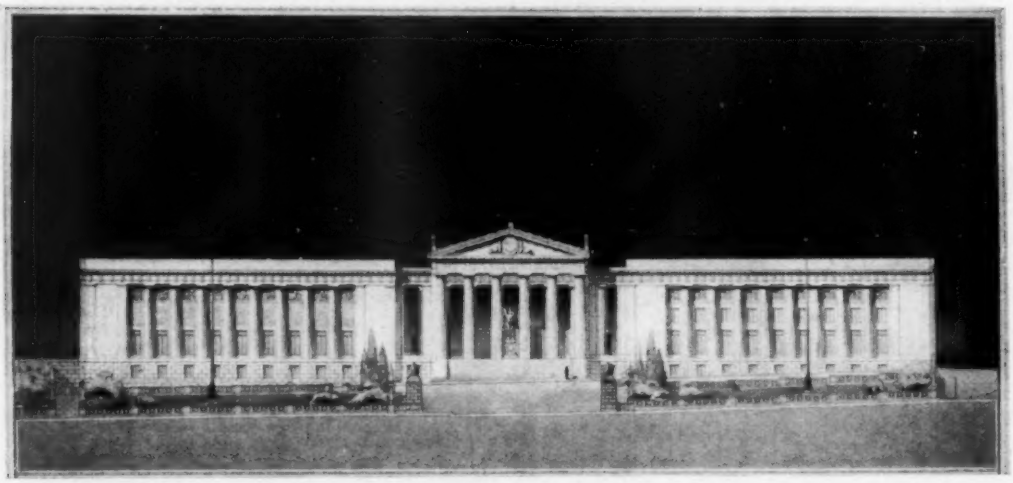
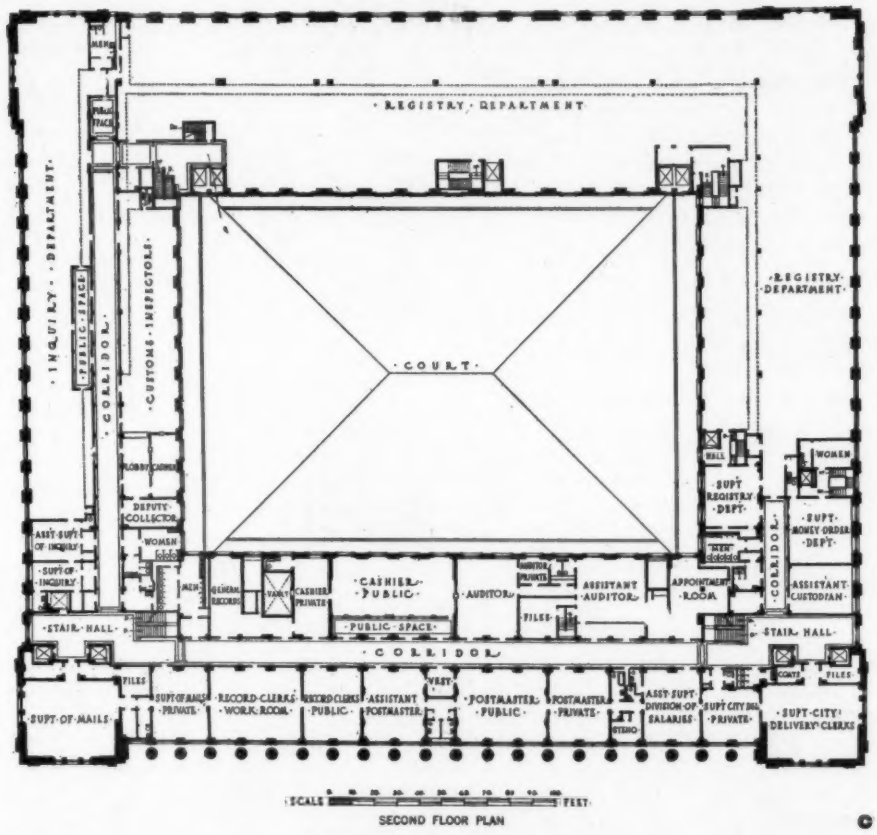


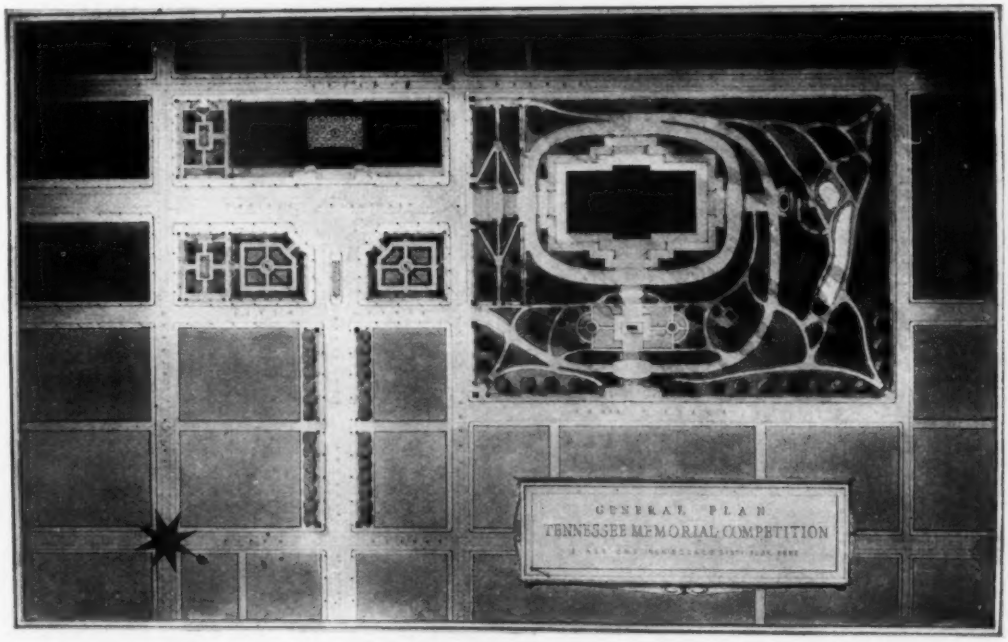
First Floor Plan, U. S. Post Office, New York (1913)



PRINCIPAL ELEVATION
Tennessee Memorial Competition



U. S. Post Office, New York (1913)



Tennessee Memorial Competition

McKim, Mead & White

(Continued from page 420)

ing. Today their work is used freely as examples which others follow, as witness the genesis of a type for the great apartment houses built within the last ten years, so many of which follow the style of that at 998 Fifth Avenue built in 1911 for the Century Holding Company.

TENNESSEE MEMORIAL

An illustration of the proposed Tennessee Memorial shows the latest competition won by McKim, Mead & White in association with Edward E. Dougherty, the decision of the judges having been made in March of the current year. A study of these competition drawings, together with the problem, shows how completely appropriate this structure will be to the requirements presented.

This building is not unlikely to establish a type for similar structures throughout the land.

A complete list of those who have been connected with the office of McKim, Mead & White from 1879 to date would include about 700 names.

THE following list gives the names of a few whose activities and accomplishments have made them well known in the profession:

Lewis Colt Albro
Louis D. Ayres
Francis H. Bacon
James Brite
William A. Boring
Edward L. Tilton
Henry Bacon
Walter D. Bliss
William B. Faville
Royal I. Cortissoz
John M. Carrere
Thomas Hastings
Edward P. Casey
James Wall Finn
Cass Gilbert
Paul Gmelin
A. D. F. Hamlin
John Mead Howells
Francis L. V. Hoppin
Terence A. Koen
John Galen Howard
Austin W. Lord
J. Monroe Hewlett
Frank J. Helmle
Louis Kamper
Thomas M. Kellogg
W. P. Laird
Harrie C. Lindeberg
Lionel Moses
H. Van Buren Magonigle
William E. Mowbray
Albert Randolph Ross
Philip Richardson
Edward P. York
Philip Sawyer
Gorham Phillips Stevens
Evarts Tracy
Egerton Swartwout
Joseph M. Wells
H. Hobart Weekes
Thomas Wight

·EDITORIAL·COMMENT·

THE HISTORY OF McKim, Mead & White, and the illustration of certain examples of work by that firm set forth in this issue need no editorial reference to accent their importance. Wherever the art of architecture is practiced, this firm is known and its great creative ability appreciated. But there are other, and to many, equally important aspects of its place in the history of architecture in the United States, that are not so widely known. One phase, in particular, is of so great importance that the editors of THE AMERICAN ARCHITECT set out, as far as might be possible, to make some permanent record of it.

In a series of articles on Architectural Education, printed in recent issues of this journal, Mr. C. H. Blackall, writing of Architectural Offices, made the following statement:

"Up to less than two generations ago the only architectural education available for the student was that afforded by offices, or something corresponding thereto. In the great creative periods of architecture this was enough, and it surely produced some marvelous results, not wholly, of course, due to the simple system employed, but more probably because of the fact that the system was part of the resulting architecture, and the student grew up inevitably in the footsteps of his master and was able to hand down the principles unbroken to his successors. The schools for teaching architecture as such have not been going long enough to demonstrate that they are all that their best friends claim for them, but no one could deny that as an adjunct of the office, it is possible for them to meet a very important function. Our danger in the past and for the future lies in the fact that we are apt to think the schools will do it all and the offices have no obligation in the matter, whereas the real burden of architectural education rests not upon the schools but upon the offices. The more practicing architects can appreciate this and give of their very best to the young men, treating them as apprentices, as equals and as successors, rather than as mere draftsmen, the more surely will we be able to develop real architecture. An institution never developed a school of architecture in the broad sense, and even in this country where schools have taken so prominent a part, the real growth of the last twenty-five years has been through the office. One has only to consider the career and the influence of McKim, Mead & White to see how true this statement is. Probably no other one firm has had such influence on the young men as has been exercised by the organization which bears this name, an organization which was so coherent and united in its aims and methods that the death of two of the principals has not brought any perceptible change in the character of the output, and the young men who have graduated from this office and risen to honors and opportunities in the profession, are scattered over the whole country and afford unquestioned proof that this office is a real training field for the young architect."

It was the foregoing that suggested the desirability of some acknowledgment in permanent form of the great service given by McKim, Mead & White in the education of those architectural students who were so fortunate as to become connected with their office after their university course in architecture. Mr. Blackall has recorded the fact and Mr. Moses has supplied the details.

In view of all these things, this office becomes something more than an association of a group of men engaged in the practice of architecture. It is a national educational institution. It is a post-graduate college, where the architectural student of demonstrated fitness is taken in hand and guided with the finest sense of duty into the path that leads to highest achievement. There is no obligation as to this work, but the splendid tradition established by the founders of this firm have been assumed by their successors and no abatement of effort may be detected.

There is no copyright, no monopoly on so fine a course. Every individual practicing architect may, and undoubtedly should, pursue a similar one. In all art, and particularly the art of architecture, there is rightfully no room for jealousies or fear of competition. The normally constituted artist sees no competition in the far reaching success of his brethren. The master of an atelier is filled with pride when some pupil has achieved a big success. It is the broad man who gathers about him as assistants in his work the best trained group he can command. It is the most perfect results that he aspires to, and he is willing, if he is broad enough, to share the glory of achievement with those who have helped him attain it.

It is not detracting from the work of the men whose names are appended to Mr. Moses' article, to state that the foundations of their successes were laid in this great office. What McKim, Mead & White have accomplished in bringing to the highest perfection the essentials of architectural education, others may attempt and by equally well pursued methods, attain.

And, if such methods are pursued, our architectural schools may, perhaps, as many of them

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now seem disposed, be purely theoretical in their curricula, and the student find in his post-graduate experience in some office, the essentials that will fit him for practice. Here we have the spirit of the "elder brother," so loudly proclaimed in other fields and so indifferently performed, brought to its highest perfection. And in the minds of men who have finally set forth on their own account to practice architecture after experience in an office where the atmosphere is so highly educational, the rivalry between the memories of their university lives and those of the splendid association in their first years of office life, is so very keen, that each vies with the other in affectionate regard.

* * *

FOR THE FIRST TIME in the history of American industrial development the Construction Industry has united all its elements for the common good—manufacturers, labor, and the professional branches—in an effort to raise the standards and efficiency of the industry and improve the service which it renders the public. This movement takes the form of a proposed Construction Council. It brings together for conference, for betterment of understanding and for common action the architects, the engineers, labor contractors, materials manufacturers and dealers, bankers and insurance men—all elements concerned with building work of any description.

It is stipulated that all the work of the proposed Council to be organized must square with the public welfare. So dominant has this idea been in the preliminary conferences that Secretary of Commerce Hoover, seeing the benefits that will result, has taken the responsibility of presiding at the formal organizing meeting in Washington, D. C., June 19 and 20, and Franklin D. Roosevelt, of New York, former Assistant Secretary of the Navy, has agreed to accept the presidency of the organization. The possibilities of the new organization are tremendous.

Instead of thinking of the building of houses as the individual expression of the fancy of the individual citizens, of the building of highways and railroads as merely the means of an industry we call transportation, of factory building and hydro-electric construction as isolated enterprises embarked in by isolated groups of individuals for private gain, we must now think of construction as we do of agriculture, or of mining, or of manufacturing—as one of the great creators of permanent wealth, as one of the foundation stones in our civilization on which our progress is built.

Already indications of this are evident. Construction reports have become equal to crop reports as barometric indicators of the material prosperity of the country. On their rise and fall depends the well-being of millions of our people, the success of great enterprises, the future welfare of our citizens.

The popular belief is that American industry is divided into four basic industries—(1) agriculture, (2) manufacture, (3)transportation and communication, (4) mining and forestry. Such a classification leaves out of consideration, however, what has been demonstrated after investigation to be the second most important industry in the country, namely, construction. When considered from the standpoint of the yearly volume and money involved, this comes second only to agriculture and is among the first of all industries when expressed in terms of labor. Investigation has shown that the number of workers, who together with their families depend upon the construction industry for a livelihood, totals approximately 11,000,000 persons. It was conservatively estimated that 24% of our annual capital accumulation and over 50% of our national savings are absorbed by this great industry every normal year. Approximately nine-tenths of all iron, copper and zinc and 95% of all the lead produced in this country are consumed in construction.

The way has been well prepared for the great national movement now launched. Nearly every one of the 250 national associations in the industry has tested out its own work and learned from experience the large amount of duplicate effort and its inability to grapple effectively with the problems that extend beyond its special field. They are ready and eager to have these common problems taken over by an all-embracing organization so that there may be the elimination of duplication and more resultful work. They appreciate that the public demand will no longer wait and that only through a broad, virile and effective movement, dedicated to the improvement of the service which construction renders the community, states and nation can the industry gain public confidence. Through co-ordinated action there is opportunity for tremendous waste elimination, assuring to the public the very best returns for their construction expenditure.

Some of the associations engaged in the organization work have been the American Institute of Architects, the Federated American Engineering Societies, the Building Trades Department of the American Federation of Labor, the Associated General Contractors, the National Federation of Construction Industries, the National Building Congress, the National Association of Building Exchanges, the Building Trades Employers' Association, besides a large number of associations of manufacturers.

With this strong backing the American Construction Council should quickly be able to play an important part in the industrial life of the nation. The time is most propitious for action.

THE MUNICIPAL BUILDING, NEW YORK (1908-1910)
McKIM, MEAD & WHITE, ARCHITECTS
(Photo Copyright by Wurts Bros.)

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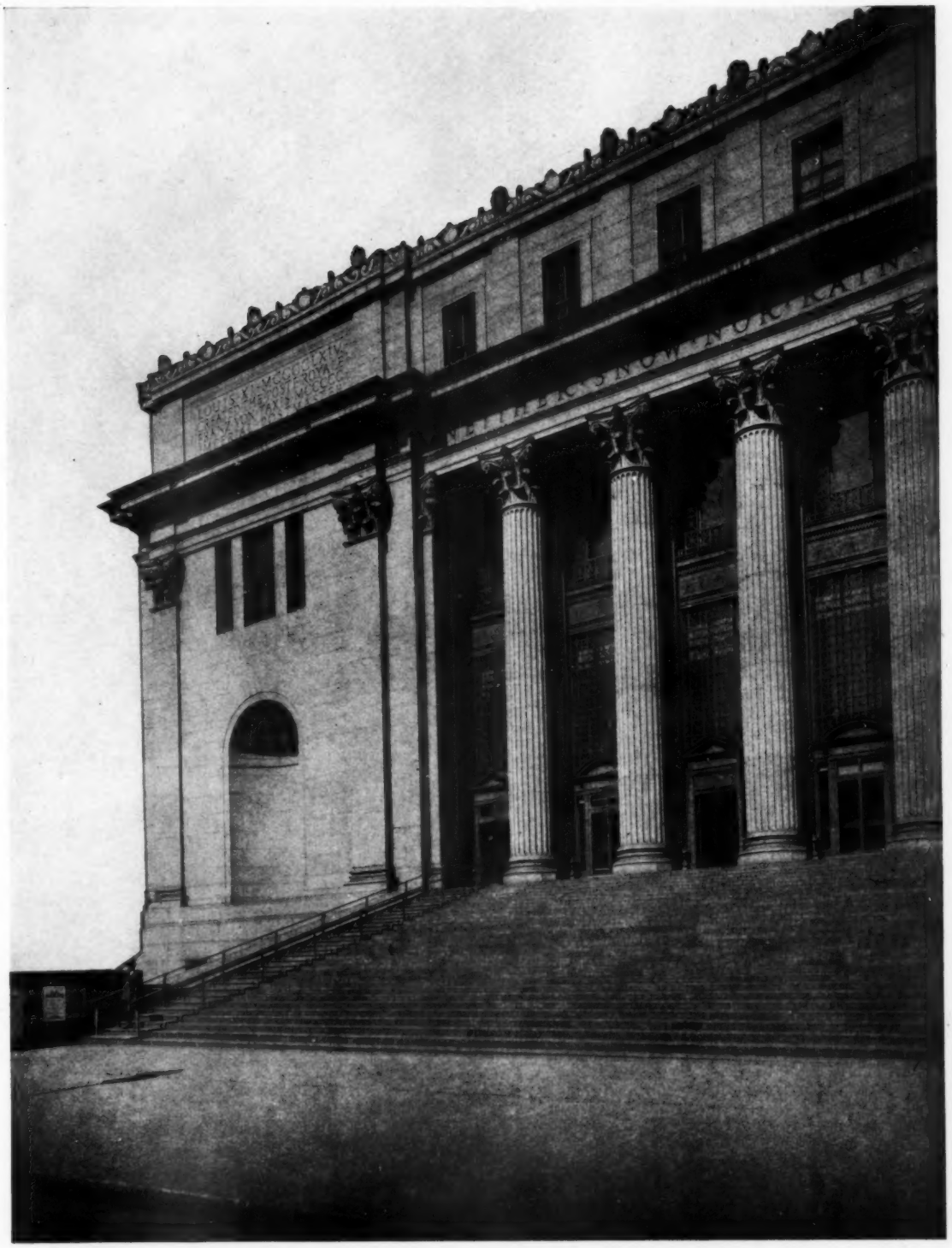
UNITED STATES POST OFFICE, NEW YORK (1913)

McKIM, MEAD & WHITE, ARCHITECTS



DETAIL, U. S. POST OFFICE, NEW YORK (1913)

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HOTEL PENNSYLVANIA, NEW YORK (1920)

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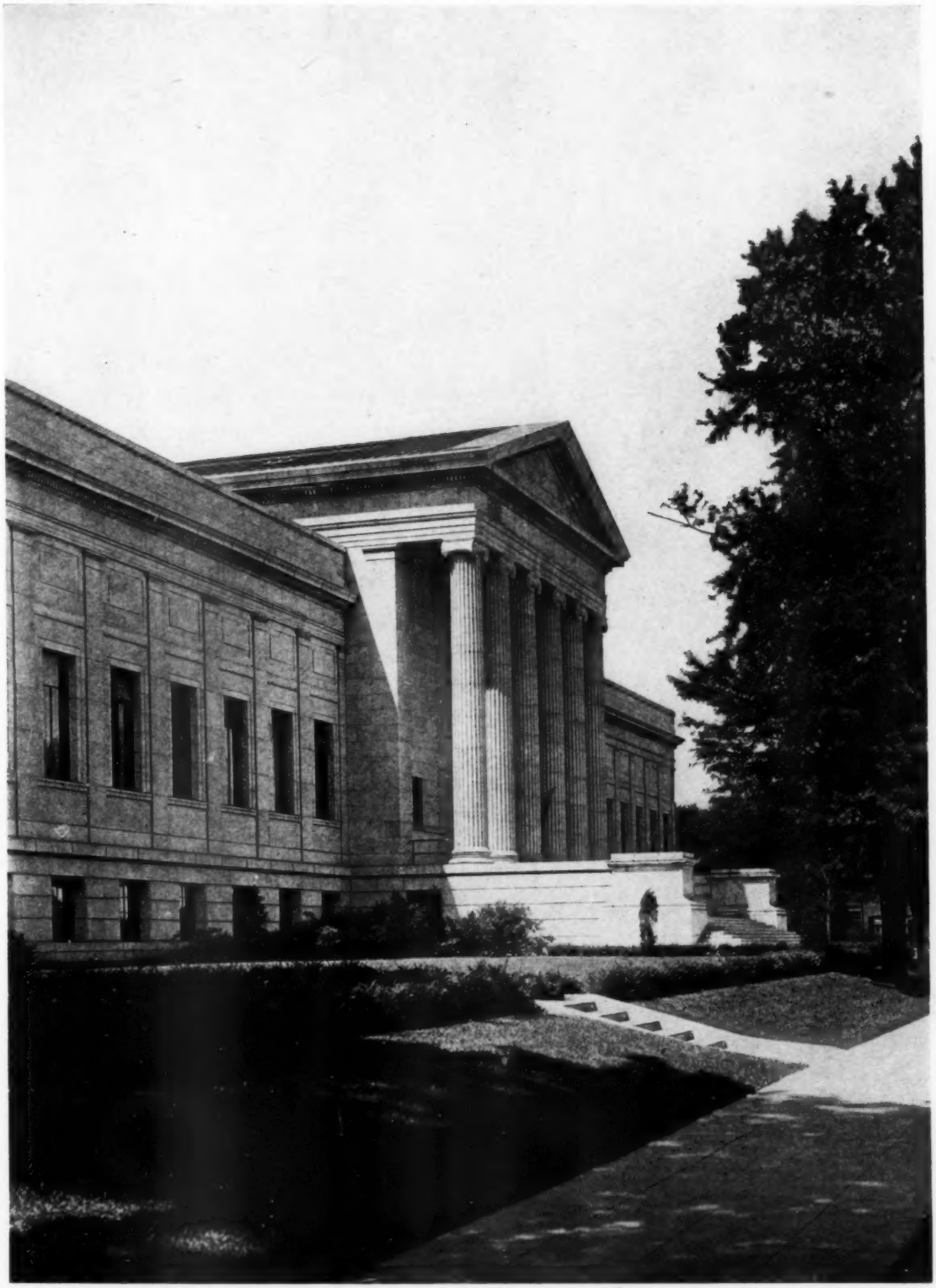

MINNEAPOLIS MUSEUM OF FINE ARTS (1914)

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THE NATIONAL McKINLEY BIRTHPLACE MEMORIAL, NILES, OHIO (1915)

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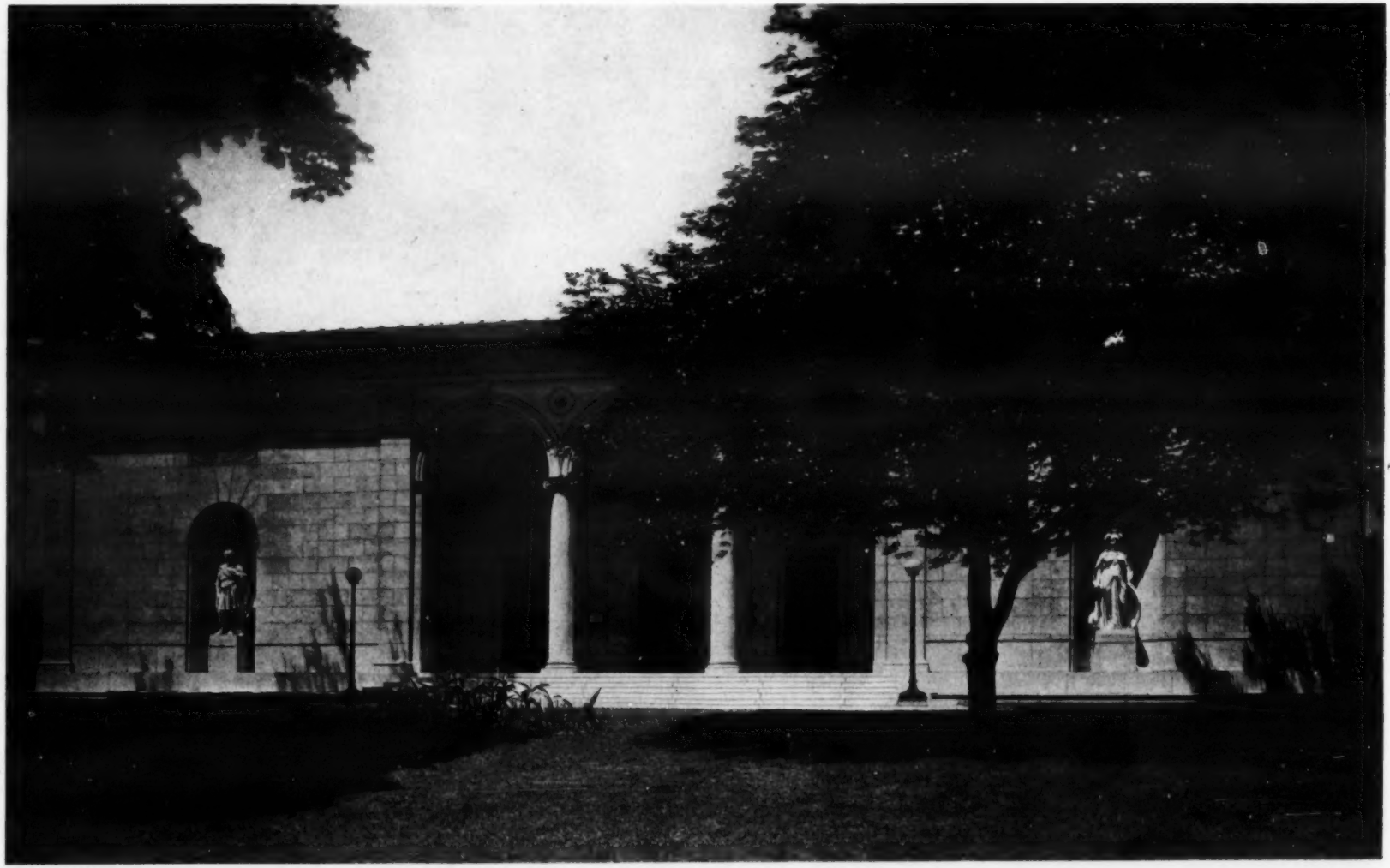


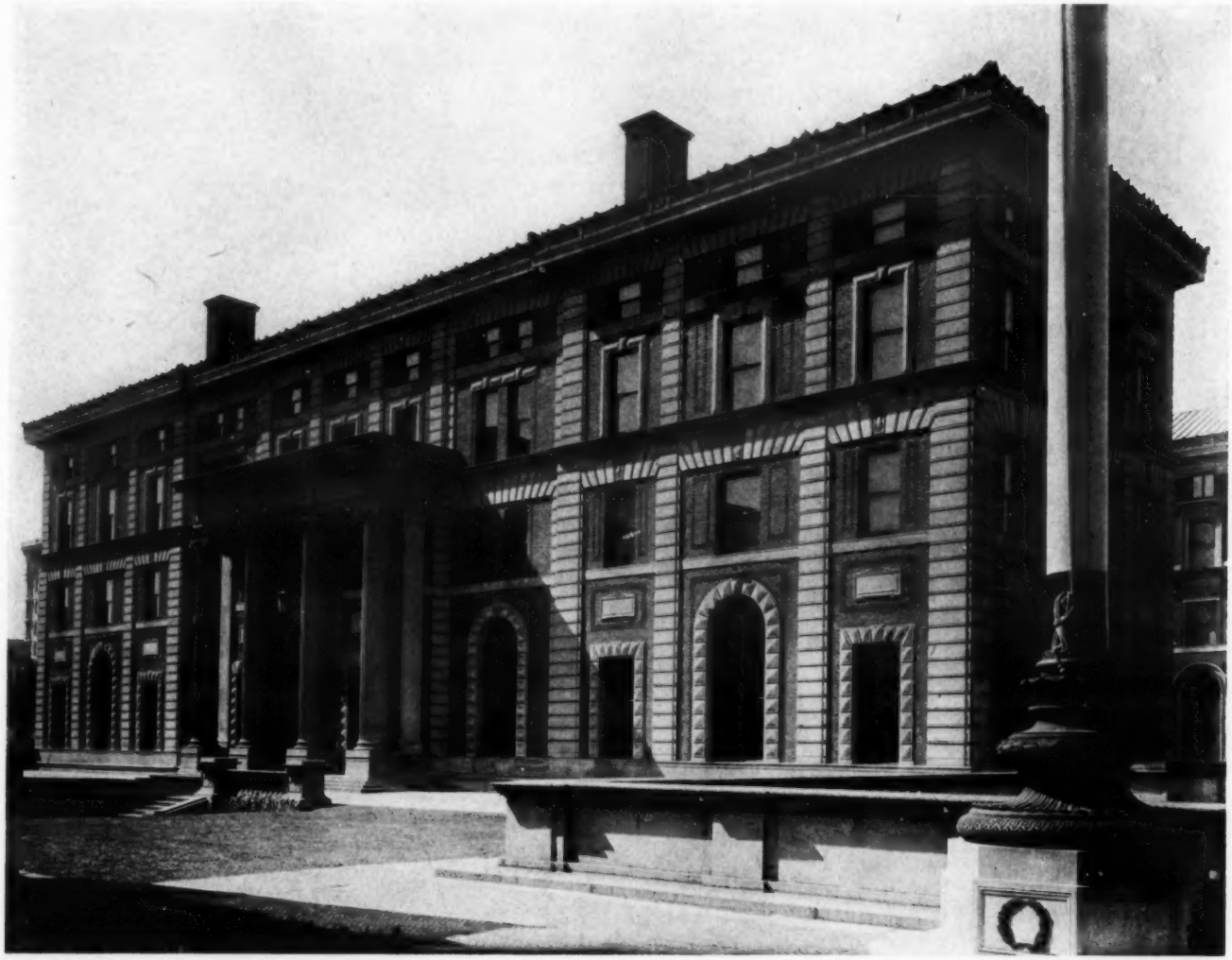
BUTLER ART INSTITUTE, YOUNGSTOWN, OHIO (1917)

McKIM, MEAD & WHITE, ARCHITECTS

AVERY BUILDING, SCHOOL OF ARCHITECTURE, COLUMBIA UNIVERSITY (1912)

McKIM, MEAD & WHITE, ARCHITECTS

VOL. CXXI, NO. 2394 MAY 24, 1922



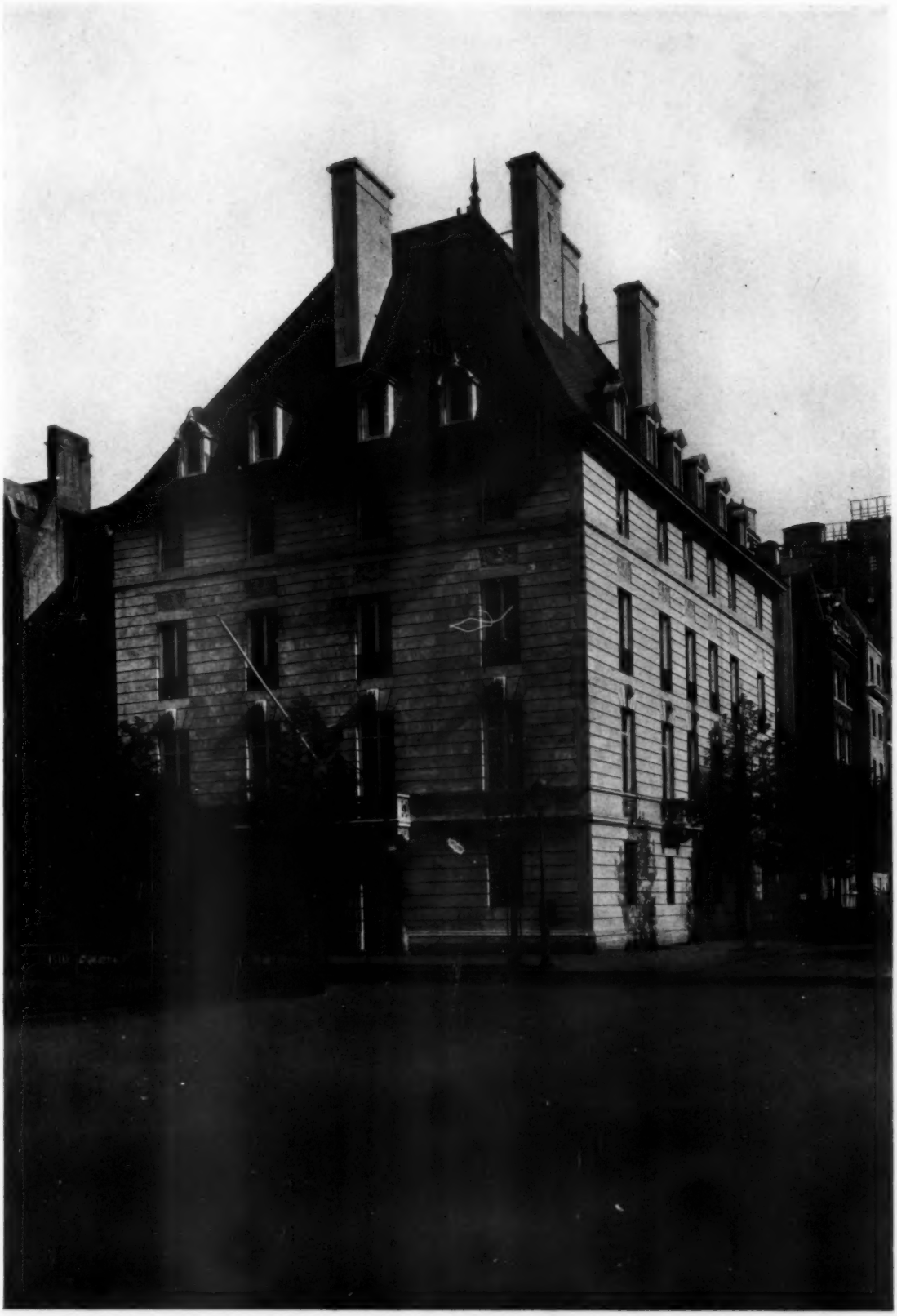
KENT HALL, SCHOOL OF LAW, COLUMBIA UNIVERSITY (1910)

McKIM, MEAD & WHITE, ARCHITECTS

MAIN ENTRANCE AND ADMINISTRATION BUILDING

THE BURKE FOUNDATION HOSPITAL FOR CONVALESCENTS, WHITE PLAINS, N. Y. (1914)

McKIM, MEAD & WHITE, ARCHITECTS



HOUSE FOR GERALDYN REDMOND, ESQ., AND THE COUNTESS DE LAUGIER VILLARS, NEW YORK (1914)

McKIM, MEAD & WHITE, ARCHITECTS

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VOL. CXXI, NO. 2394 MAY 24, 1922

THE RACQUET AND TENNIS CLUB, NEW YORK (1917)

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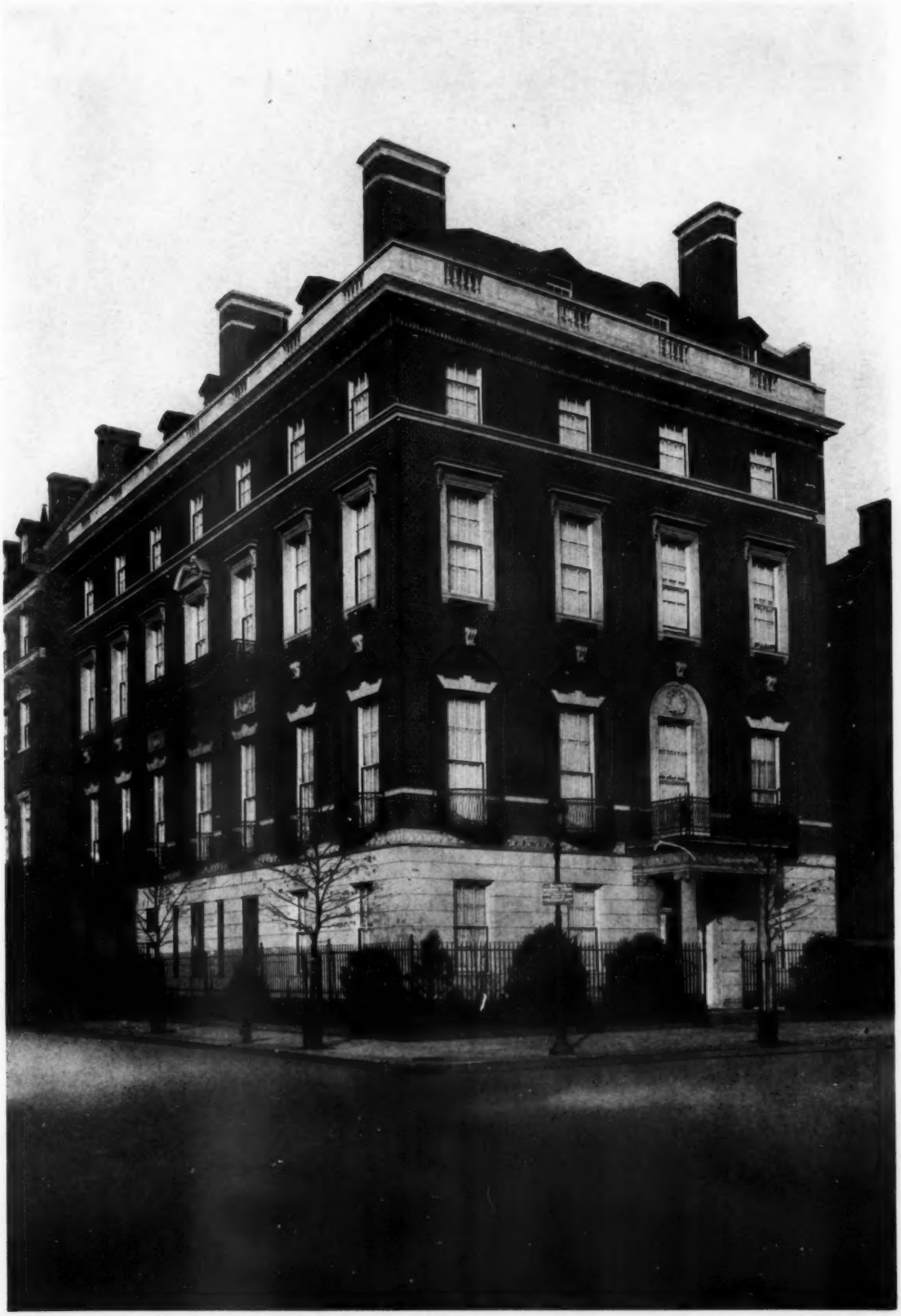

HOUSE OF PERCY PYNE, ESQ., NEW YORK (1911)

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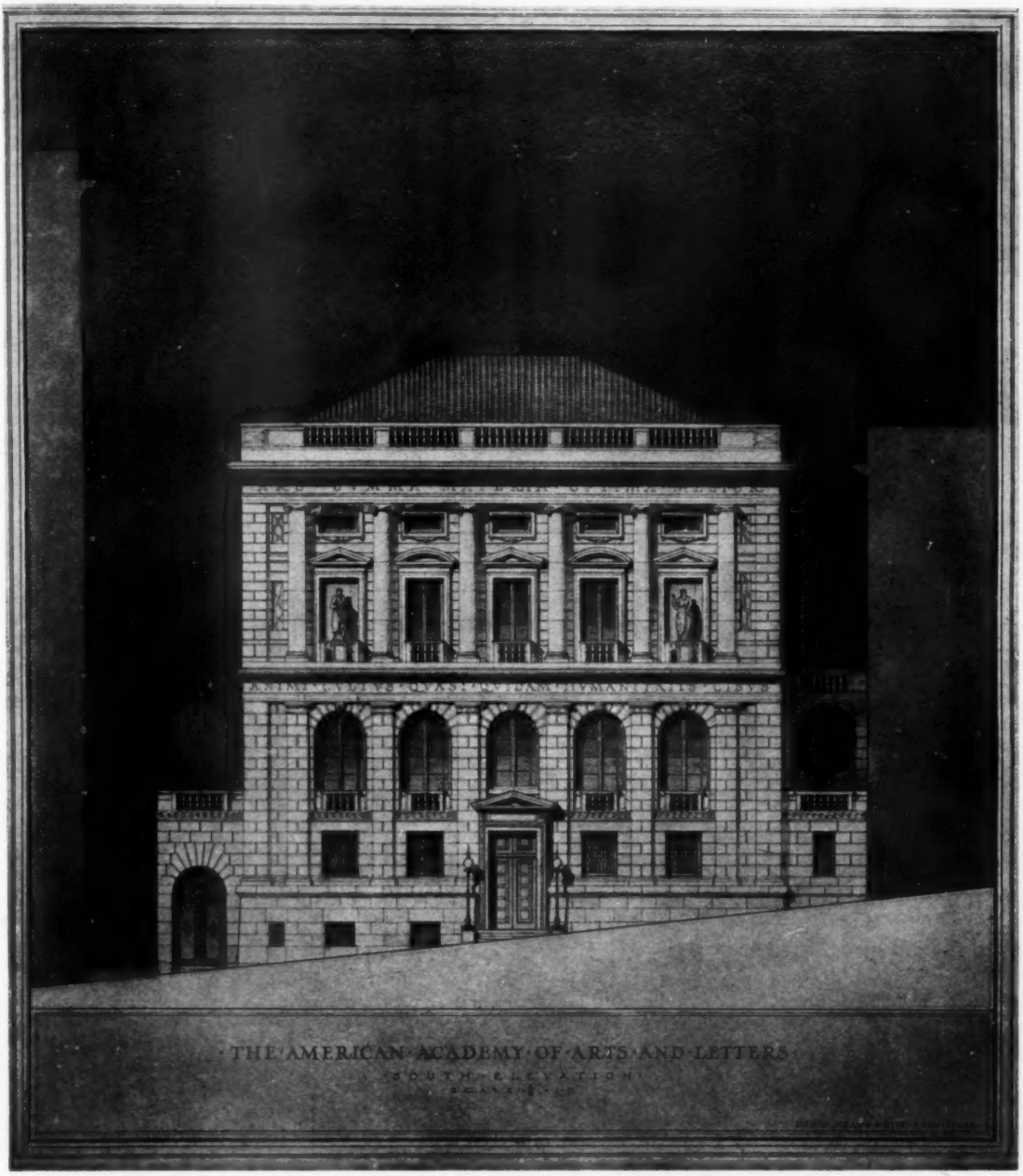
BUILDING FOR THE AMERICAN ACADEMY IN ROME (1913)

McKIM, MEAD & WHITE, ARCHITECTS

BANK OF MONTREAL, WINNIPEG BRANCH, WINNIPEG, MANITOBA (1911)

McKIM, MEAD & WHITE, ARCHITECTS



McKIM, MEAD & WHITE, ARCHITECTS

(Now under construction)

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STAINED GLASS — 1. THE MAKING OF A WINDOW

BY JOSEPH G. REYNOLDS, JR., Craftsman

THE origin of the making of glass is so remote as to be lost in the mists of legendary days. But the painting and the making of stained glass windows is comparatively a new art, belonging wholly to the Christian Era. It developed along with and as a part of Gothic architecture, until under the patronage and protection of the Church in the Middle Ages, the art speedily reached a high state of perfection.

Many theories have been advanced to account for the origin of the idea of using stained glass in windows. But in all the study that has been given to early work no gradual development from crude beginnings has ever been traced. Indeed the very oldest windows dating from the eleventh and twelfth centuries are today the most beautiful in existence. This fact tends to show that the necessary development probably took place in another craft, and the knowledge thus gained was then made use of in this one.

Fig. 1. Early Limoges Champlevé enamel plaque, from the Metropolitan Museum of Art

Mr. Westlake in his "History of Design in Painted Glass" develops a very plausible theory that the first stained glass window was inspired by the early enamels. Almost every one knows what a cloisonné enamel plaque is. Upon a copper base are soldered copper wires in some sort of a design. The spaces between the wires are filled with opaque colored enamel, and the plaque is fired in a kiln. Place this cloisonné plaque upright against the light, substitute lead for the copper wires, use transparent for opaque glass and you have a stained glass window.

Whether the theory that this is the prototype of the stained glass window is correct or not, certain it is that a very close relation existed between the enameler's craft as practiced at Limoges, France, and the craft of the mediæval glazier. The accompanying illustrations show the Baptism of Our Lord. One is an early champlevé enamel plaque now in the Morgan collection of enamels at the Metropolitan Museum of Art, New York, (Fig. 1), and the other, a medallion from the twelfth century great central west window in the Cathedral at Chartres, (Fig. 2). The composition, the drawing of the figures and details and especially the naive arrangement of the river Jordan—in which Christ is standing waist deep, while Saint John the Baptist and the Angel remain dry shod—are strikingly alike.

Briefly stated, a stained glass window is a mosaic of pieces of colored glass firmly held together in their correct positions by strips of grooved metal called leads.

Literally, stained glass is glass that has been colored in the making, not by the craftsman who constructs the window, but by the maker of the glass itself. The color is produced by the admixture of various metallic oxides in the molten mass while it is "in the pot," to use the technical phrase; hence the term "pot-metal" glass. Again painted glass, whether stained or white, has had an opaque pigment painted upon its surface and then has been "fired" or burned in a kiln. It should be borne in mind that the pigment is employed merely for giving detail and stopping out light where desirable, and not to give color.

Fig. 2. Twelfth Century Medallion from the great central West window in the Cathedral at Chartres

A visit to the studio of a glass worker is of unusual interest in this commercial age of ours, for this ancient craft is one of the few examples of the all but vanished crafts in which no ma-

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chinery is used in the processes of manufacture.

After going through a glass worker's studio the wife of an eminent sculptor was heard to remark that it seemed as though she had almost stepped backward into mediaeval times. She found there a spirit of friendly co-operation, an earnest desire on the part of each worker to contribute the best artistic efforts of which he was capable, and a joy in the work. These factors, she said, are very strongly suggestive of the mediaeval guilds.

Then, too, the methods employed in the workshop today are essentially the same as they were in the Middle Ages. The mediaeval worker drew his cartoons on the work bench in charcoal or chalk. We today make our full sized drawings with charcoal on heavy white paper. He cut his glass by drawing a red hot iron across the sheet and then snapping it in two pieces by gripping it with both hands and exerting pressure. He then shaped the piece by chipping it with a "grozing" iron. We cut our glass by means of a diamond or a steel wheel and shape the piece accurately by "grozing" with pliers. The ancient craftsman planed his lead by hand or molded it. We moderns buy ours from a manufacturer who mills it out or forces it through a die. He heated his soldering iron in a charcoal flame. We heat our irons by attaching a cord to the electric light socket in the same way that the modern housewife heats her electric flat iron.

Fig. 3. Drawing the cartoon

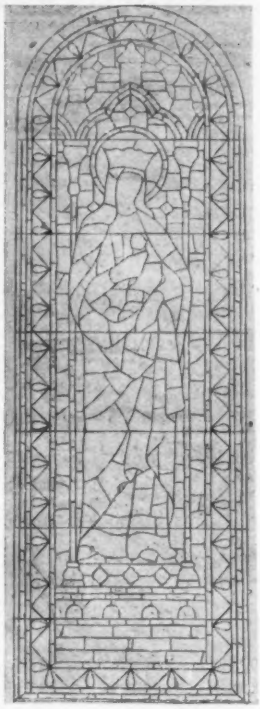

Fig. 4. Cut-line or working drawing

Let us, then, see how a window is made, and trace, by the aid of illustrations, its development from the time the order is given by the client, until the window is completed.

In the first place the design is drawn to scale and rendered in water color, the idea being to give as true and complete an impression as possible of the actual appearance of the window when finished and set in its final position.

The design having been drawn and approved by the client and the architect, the cartoon is next made. This is drawn to the actual size of the window opening and the leads, bars, and all details of the finished window are carefully planned. (Fig. 3).

From the cartoon, these lead lines and bars are reproduced in a tracing called the "cut-line" or working drawing. (Fig. 4). Next the cut-line is laid on the pattern paper with a sheet of carbon paper between. Then by going over each line with a hard pencil or stylus, an exact duplicate of the cut-line drawing is transferred to the pattern paper, and the pattern drawing is cut into separate patterns by the aid of a double-bladed knife which takes out an allowance for the "heart" of the lead, as that portion of the lead is called which lies between the "shapes" of glass.

The visitor often wonders how it is possible to keep track of all the pieces of glass, since in a large window there are hundreds, or perhaps thousands of separate pieces. This is accomplished by numbering the patterns and the cut-line drawing correspondingly so that in this way the "picture puzzle" is amazingly simplified.

The next step in the process is selecting the glass, or, as it is technically termed, "coloring" the window. With the original design as a guide, ruby, blue, green, gold, violet, and white glass of varying tones of intensity and value are selected (Fig. 5) and cut to the shapes of the patterns with a diamond or a steel wheel. (Fig. 6).

Each piece of glass is now placed on the cartoon and the detail is traced upon the glass with an opaque, vitrifiable pigment. This pigment is composed of peroxides of iron and manganese ground up with powdered flint glass or an equivalent silicate, and mixed with varnish or fatty turpentine to cause it to adhere.

The "shapes," or pieces of glass, are now assembled on a large plate glass easel beneath which lies the cut-line to serve as a guide; to this plate they are fastened by dropping a mixture of melted wax and resin at the corners of each separate piece. This process is called "waxing-up." The easel is now placed upright in a location where direct daylight will shine through, so that at last we have the first view of our colored, mosaic window. Obviously the light will shine through the cracks left between the separate pieces of glass, giving a false idea of values; for this reason the next step consists of painting out these white lines on the back of the plate glass with an opaque paint, a mixture of oil and lamp black. For the time being these lines take the place of the leads that will appear in the finished window.

Now the supplementary painting begins. (Fig. 7). Each piece of glass is covered with a thin film or "matt" of opaque pigment—the same kind of vitrifiable pigment that was used for tracing the outlines of the details, but now the adhesive medium is gum arabic instead of varnish, and the paint is thinned with water. When dry, this "matt" is rubbed with the finger or scrubbed with stiff bristle brushes until most of the pigment is removed, leaving just enough to give a more effective texture to the glass, mellowing the color without sacrificing any of its intrinsic beauty and brilliancy.

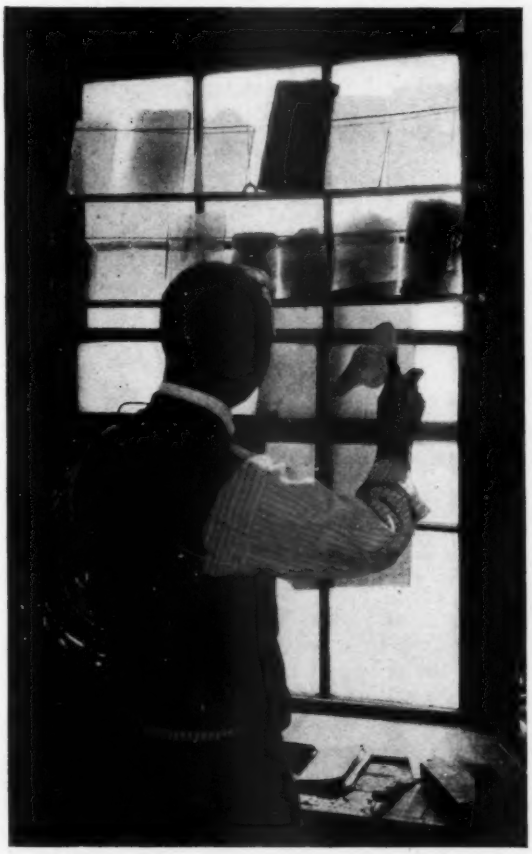

Fig. 5. Selecting the Glass

Fig. 6. Cutting the Glass

This process of painting completed, the easel is laid flat on a bench and the pieces of glass are "chipped off," that is, loosened from the plate. They are now put in the kiln or furnace and the heat gradually raised until the glass attains a cherry red. The surface is now in a molten state with the pigment that was painted on becoming fused into the very glass itself. The heat is then gradually reduced until the glass is cool enough to be safely removed. Once more the pieces are assembled on the plate glass easel and waxed up, and the window is again placed against the light. It will now be found, as had been expected, that the opacity of the film of pigment has been reduced about fifty per cent by the firing. In some cases the paint has been reduced still further or may even have burned away entirely. These will need retouching and are put through the kiln a second time. When this is done the glass is ready for the glazier.

All the pieces are now assembled on the cut-line

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drawing and the process known as "leading-up" begins. (Fig. 8). Two laths are nailed at right angles to each other on the bench and two wide leads, called binding leads, are laid alongside them. The piece of glass belonging in the corner at the glazier's left hand is inserted in the binding leads and another lead fitted to its free side. The next piece of glass fits into this, and so on until the whole panel is complete—a mosaic of pieces of glass separated and yet held together by leads. The leads are soldered at the joints, then the panel is turned over and the soldering completed on the reverse side.

Now the window is ready for the final process, cementing. A water-proof cement, composed of whiting, Portland cement, boiled linseed oil, turpentine, lamp black, and Japan dryer, is applied to each side of the panel of leaded glass and thoroughly worked under the leads. This process

Fig. 8. "Leading-Up" or Glazing
The pieces assembled on the cut-line Drawing

Fig. 7. Painting the Glass

finished and the cement given due time to harden, the window is ready to be set in place for final inspection (Fig. 9) before being boxed and shipped to the building where it is to be installed.

This, then, is a very brief outline—a bare statement of the main facts — of the processes employed in making a stained glass window. In two succeeding articles we shall take up a comparative study of the history of design, from the earliest glass of the late eleventh century to that of modern times. This brief study in design will be accompanied by photographs depicting the salient characteristics, and an explanation showing

Fig. 9. The finished Window

the relative artistic merits, of each period. We shall likewise consider the aims and ideals of the present day worker in the craft, studying the tendencies in style that influence him, the problems confronting him, and the possibilities for decorative use of stained and leaded glass in our modern buildings.

(To be continued)

AMERICAN ARCHITECTURE*

BY JOHN M. LYLE

I AM going to try to give you some idea of the great American Renaissance in Architecture which has been in full swing now for the past fifty years. I want also to tell you something of the architects themselves, many of whom I am fortunate in knowing personally.

You must bear in mind, however, that the opinions I shall express to you are purely personal and not in any sense dogmatic, for it is a great mistake to be too dogmatic in matters of taste. One must always remember that taste is an ever-changing factor, and that no two persons will agree as to what constitutes good and bad taste.

Taste and charm in architecture are qualities that are difficult to define, and must be felt to a large degree. They are, however, noticeable qualities in the work of all great architects.

I should like to urge on you all the great importance of cultivating the æsthetic side of your education; much of this you must get for yourself entirely outside of your practical and technical studies in the University or in the office.

This is doubly important for the Canadian student, because he has not the advantage of the European student in being able to see masterpieces of architecture, painting and sculpture staring him in the face at every turn.

How, you ask, is he going to form a standard of taste without going abroad?

My advice to him is, that given a certain amount of natural liking for the beautiful, he can, by study of the most interesting and fascinating kind, acquire a standard of taste that will be invaluable to him in his future career, and moreover he can continue his studies along these lines until he is ready for the grave.

He must learn of painting and painters, of sculpture and sculptors, of stained glass, of tapestries, of furniture of the different periods, of china, of silver, in short, of all *objets d'art*. It is a life study, but an entrancing one. He must read books on these subjects and books on the lives of the men who worked the masterpieces of the past.

He should not fail to go to the picture galleries, the Museum here should be an open book to him.

It is a well known fact that one often lives and works in the midst of some great political or artistic movement, without really appreciating just what is going on.

That the United States has been going through a great renaissance in architecture during the past fifty years, is just now being recognized abroad. In my opinion, the work that has been turned out by the American architects during this period, far outshines that of any other country during the same time.

Rupert Brooke, the English poet, said some ten years ago that he placed among America's five greatest achievements her modern architecture. A writer in *Country Life* remarks that "Anyone who has visited America recently will realize that if magnificent modern architecture ten years ago was one of the five finest things she has produced, this architecture has now probably reached the first place."

We now find English architectural students coming over to McKim, Mead & White's office for summer office experience.

What are the outstanding features of American architecture?

1. Its scholarship. 2. Its solidity and simplicity. 3. Its restraint. 4. Its execution. 5. Its handling of monumental work on a big scale.

Dealing with the first—its scholarship—there is no question but that the training of the American architect has had a great deal to do with the success that has attended his efforts in solving the various problems that have come before him. Following the French, rather than the English methods of architectural education, he has learned how to study, how to attack a problem, and the great success of the American designer in solving problems and in using different styles, is largely due to his education.

While it is true that they have had unequalled opportunities, it must not be forgotten that the designers have risen to them and are primarily responsible for American architecture.

Very many of the foremost American architects are graduates of American universities, and have

* *Synopsis of an address delivered before the Toronto Architectural Club.*

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supplemented their American training by a European one, principally at the Ecole des Beaux Arts. I cannot remember a single American who was in France at the same time I was, who was not a graduate of Yale, Harvard, Princeton, Columbia, or some other university. These men spent anywhere from three to six years at the Beaux Arts. It was always a source of wonder to me how many of them could speak two or three languages. All were deeply interested in architecture and had their weather eye always open for a bargain in the antiques.

Second—Its solidity and simplicity. These are undoubtedly two marked qualities noticeable in American architecture.

The American architect seems to have caught something of Sir Christopher Wren's spirit, who believed that architecture should have the attribute of the eternal and that the "little knacks" should be avoided.

The buildings seem to be made up of a few parts rather than of an infinite number of small parts, or in other words, they are well studied, well composed, with a consolidation of ornament and a simple treatment of wall surface, depending on their scale and proportion for much of their beauty.

Third—The restraint, noticeable in the best American work, is very patent when you compare it with corresponding English, French or Italian work. A building may be well proportioned and well composed as to mass, but if it is plastered indiscriminately with ornament, then the abuse of this legitimate device defeats its own object, even if the ornament be good in itself.

Fourth—The execution of the American work is of a very high order. I do not think that any country can show such a high standard of excellence as that of McKim, Mead & White, and this is also true of the work of many other firms.

I would give special credit to McKim, Mead & White for this reason, that they have always insisted on the highest possible standard in their stone work, brick, plaster, wood and iron work; picking their contractors, who, it is well known, always figured high on their jobs, for they knew that none but the best work would be accepted.

Their influence has been one of the great factors in establishing a high standard of workmanship, ably supported by the younger men of today.

The great works that have been under way in the United States have naturally attracted many of the pick of the world's craftsmen. I know of several jobs where special workmen were brought from England, France and Italy for particular work.

Five—There are only two groups of architects who have attained a marked degree of eminence in the handling of monumental problems—they are the French and the American; the Italians have never grasped the fundamental idea in monumental work, which is so closely related to planning. I am not referring so much now to monumental buildings as to large developments involving group planning.

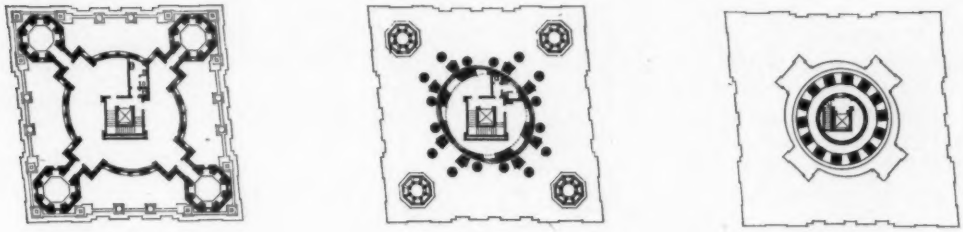
The Italian, of course, has given us some of the greatest individual monumental architecture of all time, but he rarely had that sense of placing a building or buildings so that they would count—at the head of an avenue, or to form the sides of a square. True, that Bernini's Colonnade, and Michael Angelo's wonderful Conservatore Group are masterpieces, but they are the exception. Many of the greatest buildings in Italy are lost by reason of their setting.

In the designing and handling of individual buildings of a public or monumental character, the American architect has shown great skill. True that one can often trace the influence or source of inspiration, whether Italian, French, English or Spanish, of much of the work; nevertheless, there is much personal feeling, resulting in an architecture which is distinctly American. They have realized that the bizarre and picturesque touch which may be so delightful in a small country house, is an absurdity on a bank or court house. They seem to have had the job in mind rather than the desire to use some particular piece of ornament or pediment to the detriment of the design.

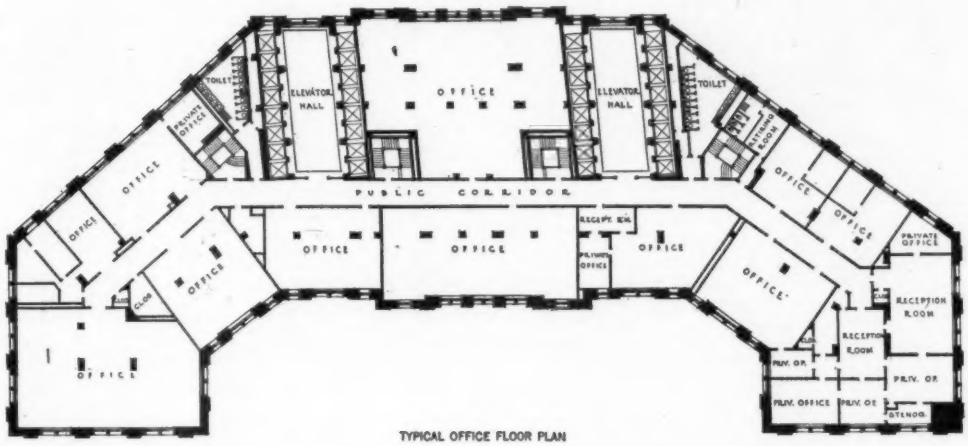
To quote from T. B. Bennett: "Great architecture has in all periods seized upon the requirements of its client and by natural expression has transformed them into works of art. It has always frankly accepted the limitations of site, material, cost of construction, and used them as a means to an end."

"The ability of the American designer to seize upon and emphasize the essentials of his problem is noteworthy, a chapel, a bank, a library, or an office building, all indicate clearly their special purpose."

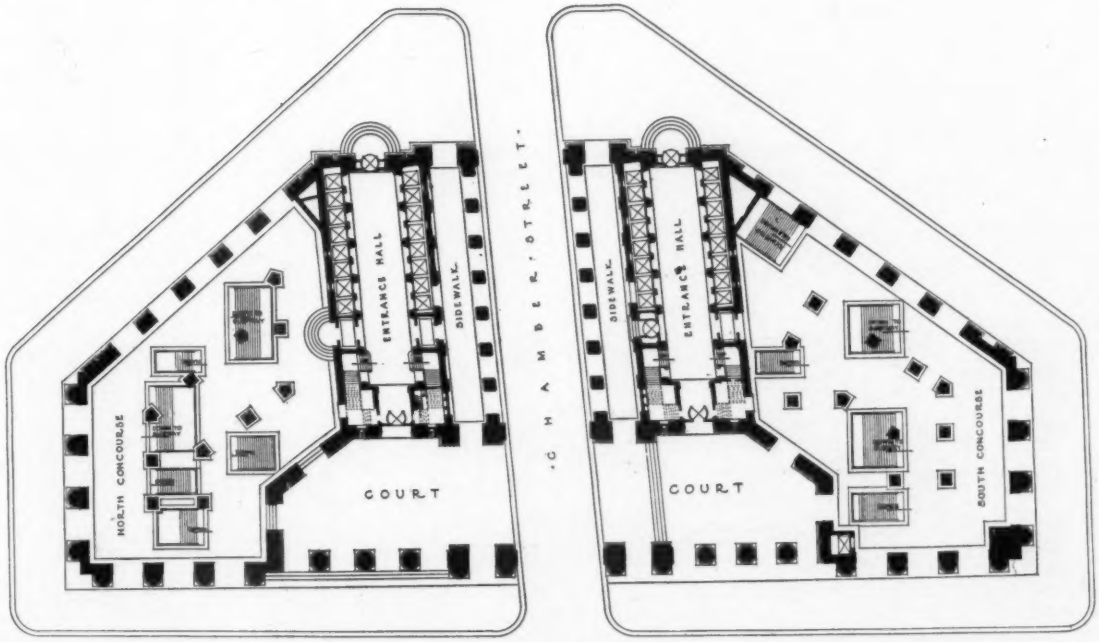
The essentials of American architecture can be defined in a few words, as the work of men of taste who have added knowledge to their ability.



PLANS OF TOWER



TYPICAL OFFICE FLOOR PLAN



GROUND FLOOR PLAN

SCALE 0 10 20 30 40 50 60 70 80 FEET

THE MUNICIPAL BUILDING, NEW YORK (1908)

McKIM, MEAD & WHITE, ARCHITECTS

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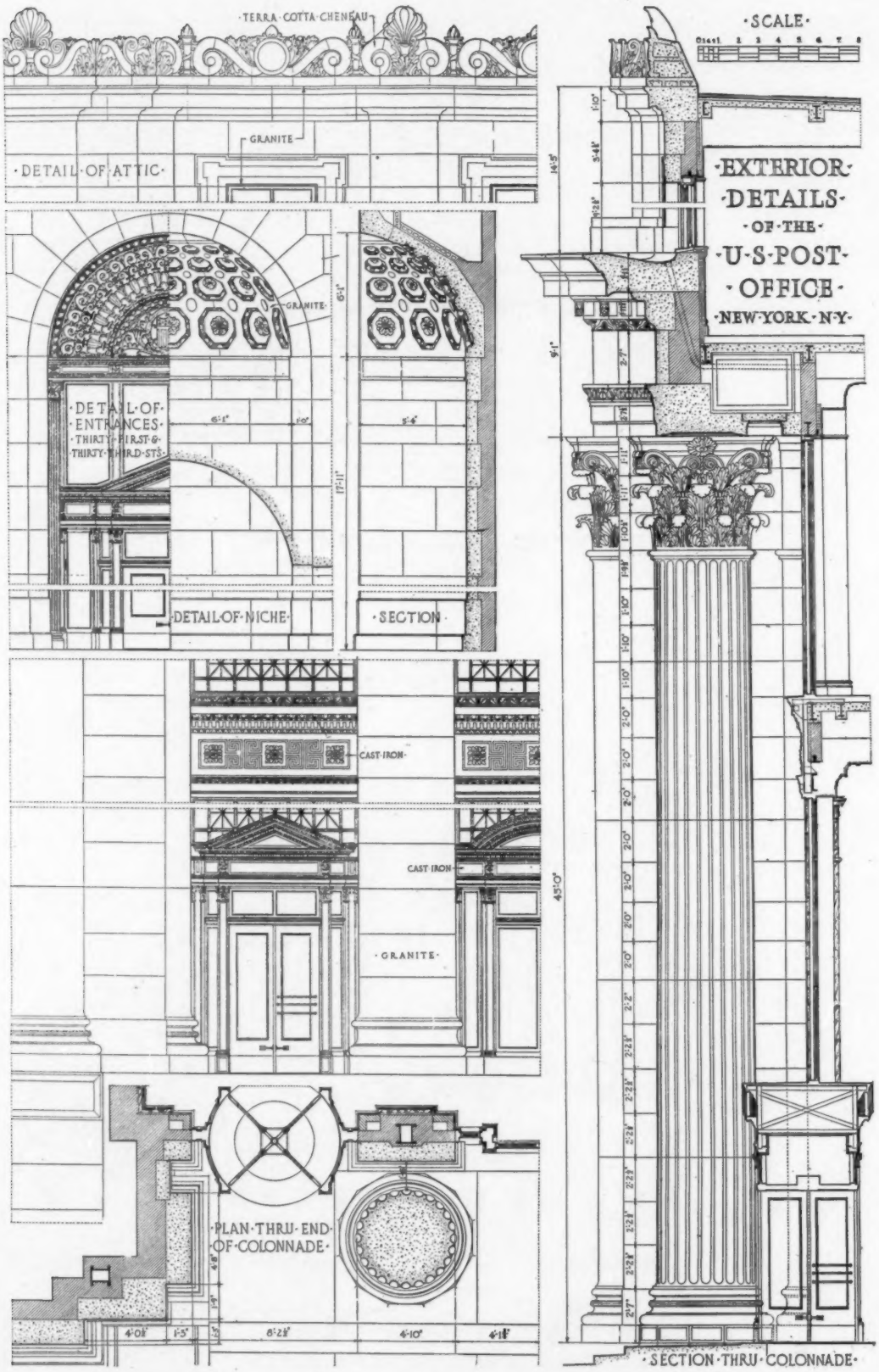
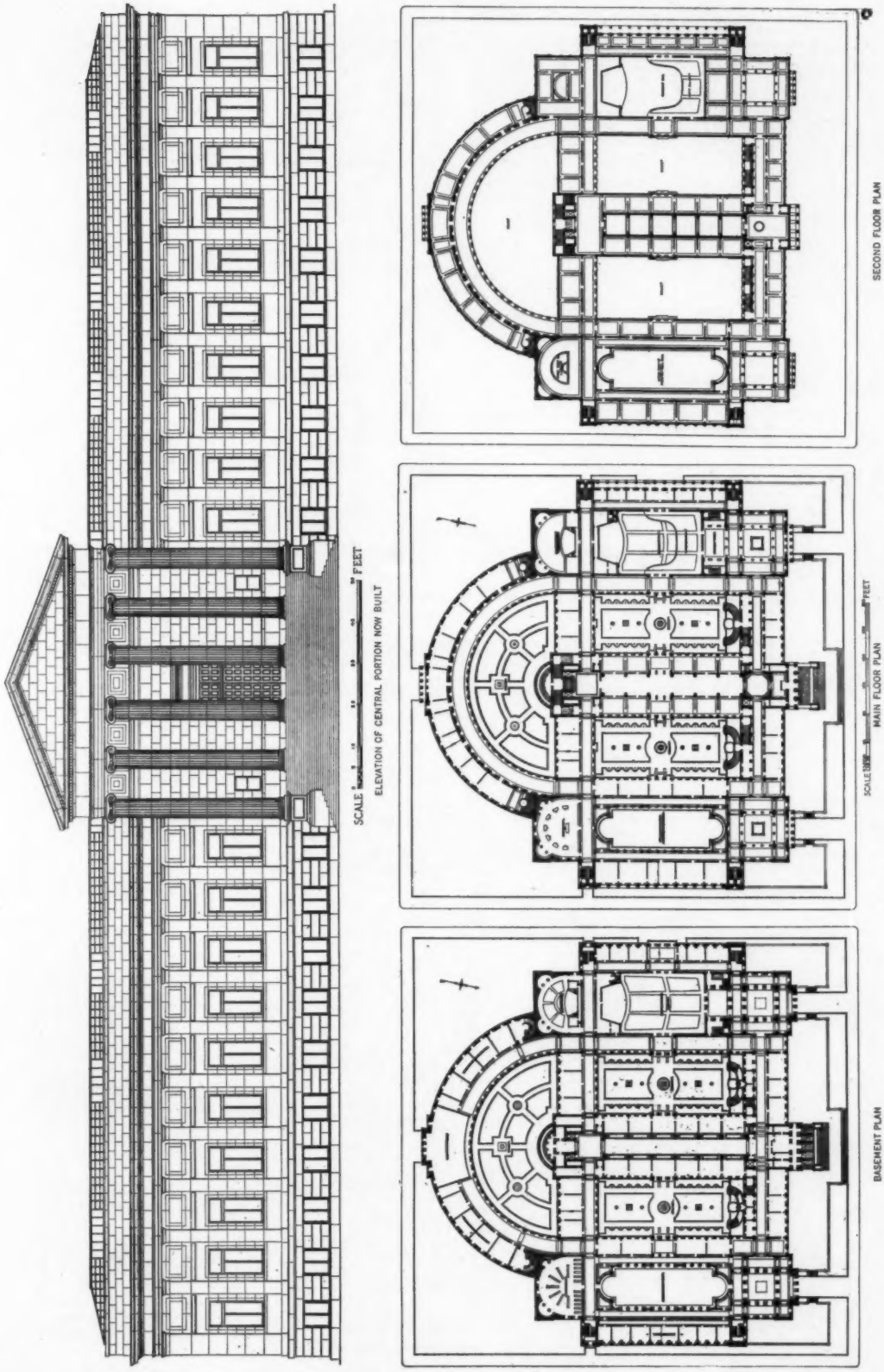


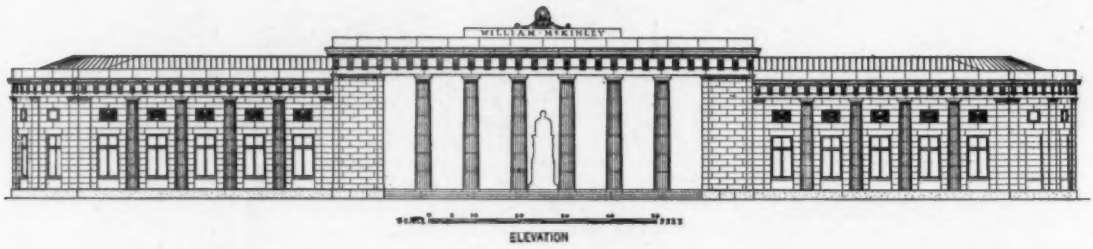
U. S. POST OFFICE, NEW YORK (1913)

McKIM, MEAD & WHITE, ARCHITECTS

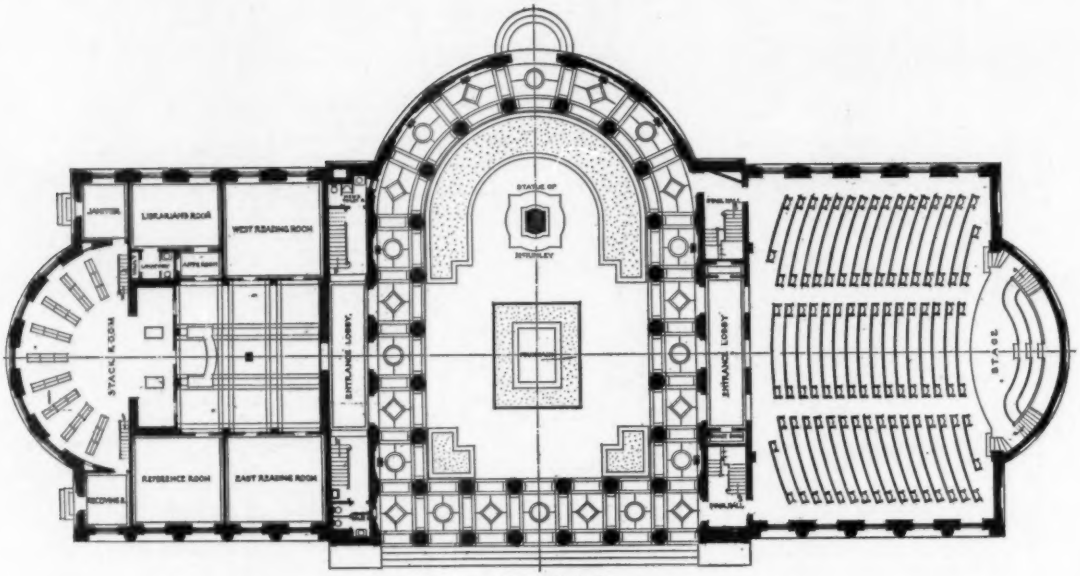


THE MINNEAPOLIS MUSEUM OF FINE ARTS (1914)

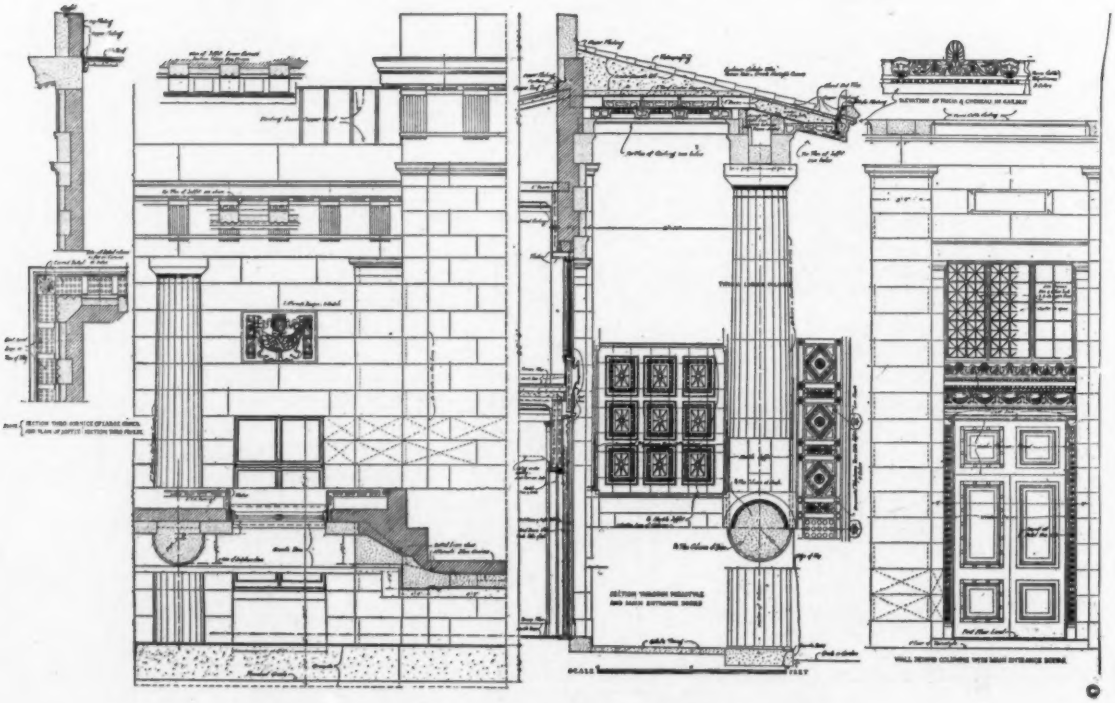
McKIM, MEAD & WHITE, ARCHITECTS



ELEVATION

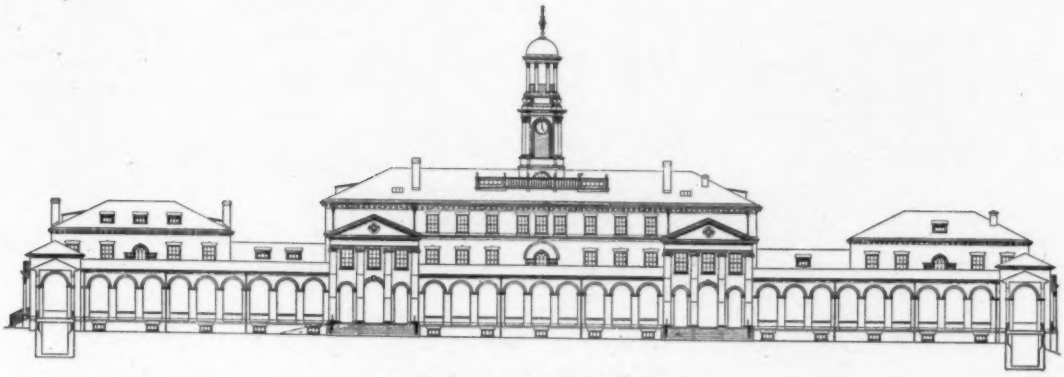


FIRST FLOOR PLAN

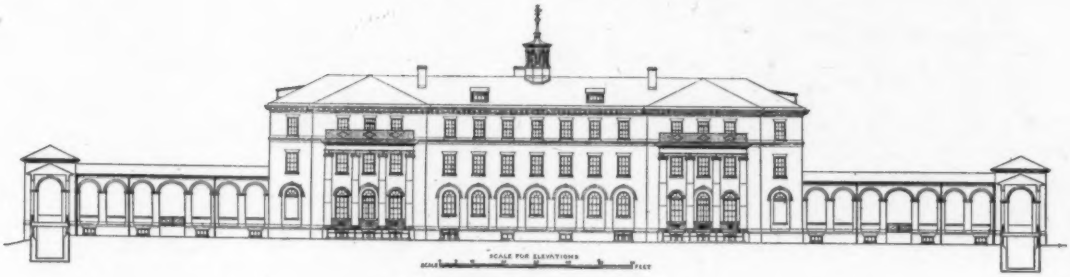


THE NATIONAL McKINLEY BIRTHPLACE MEMORIAL (1915)

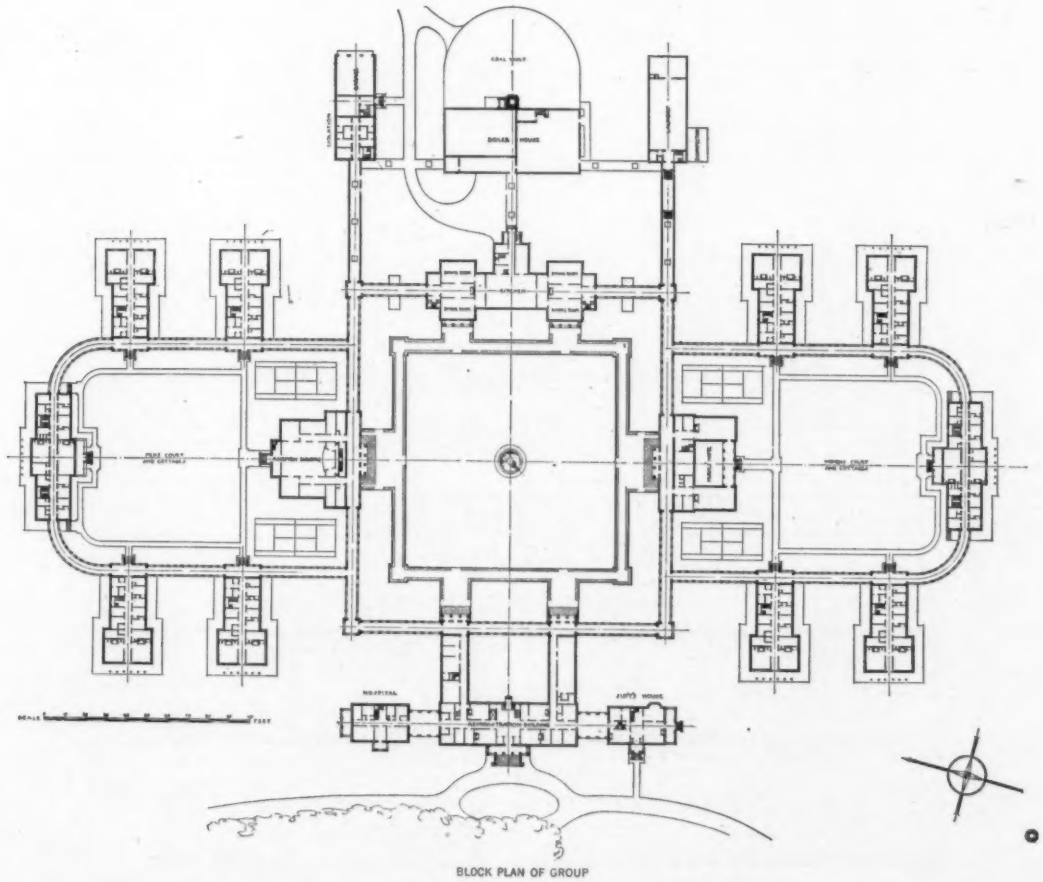
McKIM, MEAD & WHITE, ARCHITECTS



COURT ELEVATION OF ADMINISTRATION BUILDING.



COURT ELEVATION OF DINING HALL BUILDING.



BLOCK PLAN OF GROUP

THE BURKE FOUNDATION HOSPITAL FOR CONVALESCENTS, WHITE PLAINS, N. Y. (1914)

McKIM, MEAD & WHITE, ARCHITECTS

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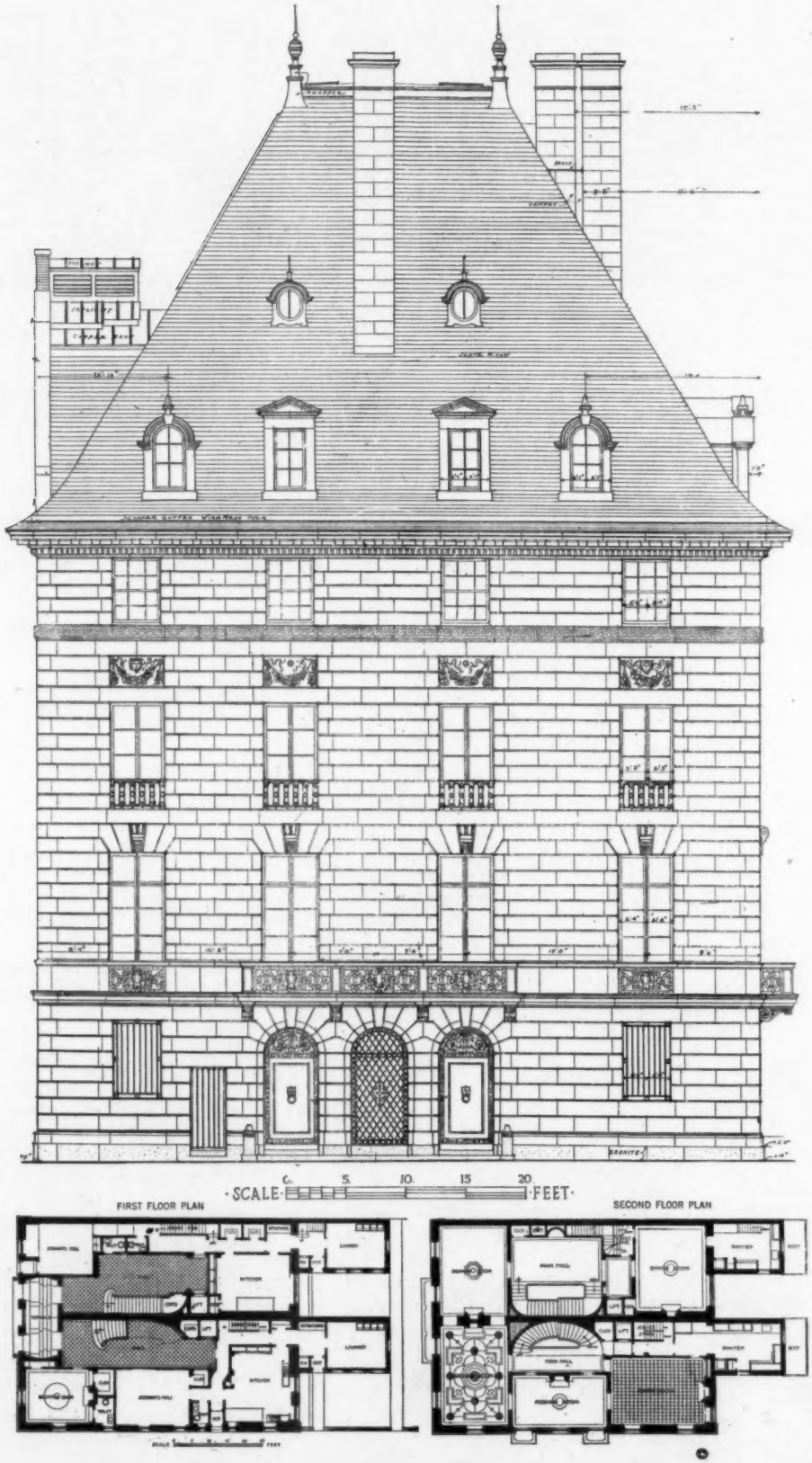
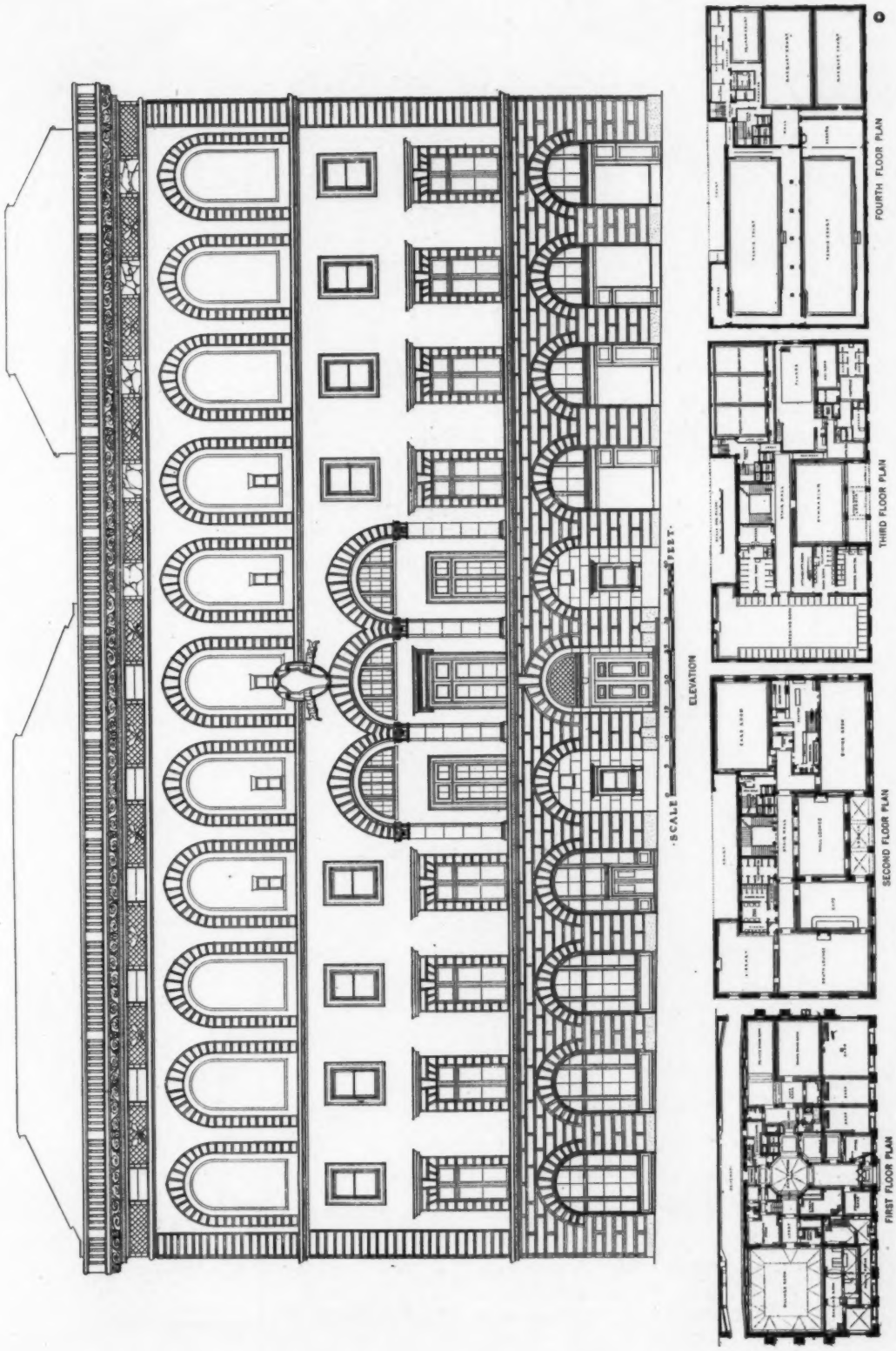


HOUSES FOR GERALDYN REDMOND, ESQ., AND THE COUNTESS DE LAUGIER VILLARS, NEW YORK (1914)



THE RACQUET AND TENNIS CLUB, NEW YORK (1917)

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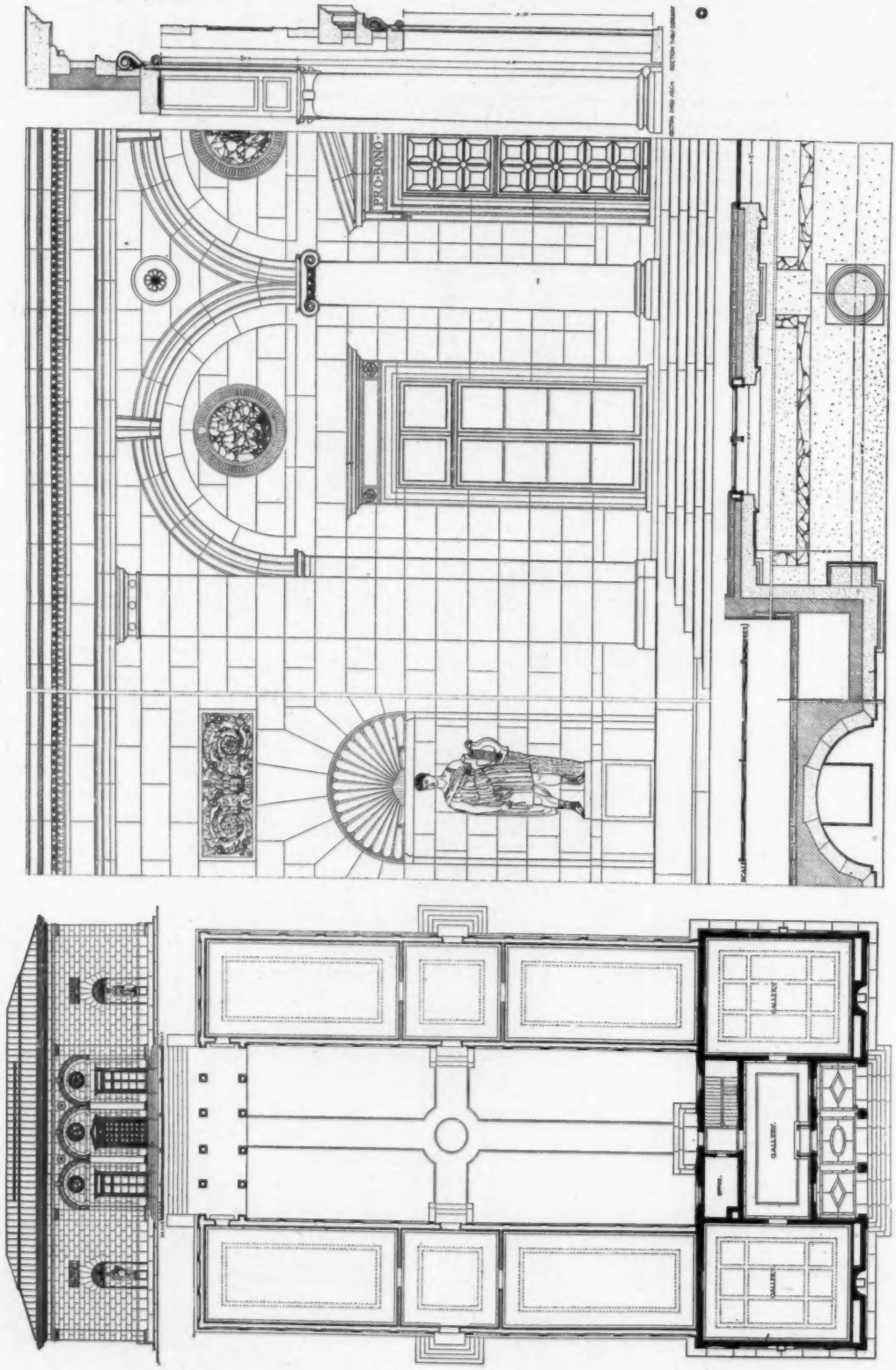

ART GALLERY FOR JOSEPH G. BUTLER, JR., YOUNGSTOWN, OHIO (1917)
McKIM, MEAD & WHITE, ARCHITECTS

DEPARTMENT OF ARCHITECTURAL ENGINEERING

ARCHITECTURAL ACOUSTICS—I

The Nature and Reduction of Office Noises

BY PAUL E. SABINE*

PART 1

QUITE apart from any considerations as to the effect of excessive and continuous noise upon the health and comfort of office workers, its effect upon the practical efficiency of the human element of business is of importance. Numerous mechanical devices have done much to speed up the machinery of modern office routine. Yet the efficiency of the whole process of business depends upon the precision and smoothness with which the human cog performs its function. Under scientific management, the effect of external conditions upon the human element must call for attention. Thus at the instigation of those interested in illuminating engineering, the effect of lighting conditions upon the speed and precision of typists and accountants has been studied by psychologists. It is equally well recognized by office managers that acoustic conditions are important as effecting speed and accuracy of office workers as well as the degree of nervous fatigue induced by their work. The din and confusion that may exist in a large office unit, to which sometimes hundreds of persons and machines may contribute, can be better imagined than described, and must be experienced to be properly appreciated.

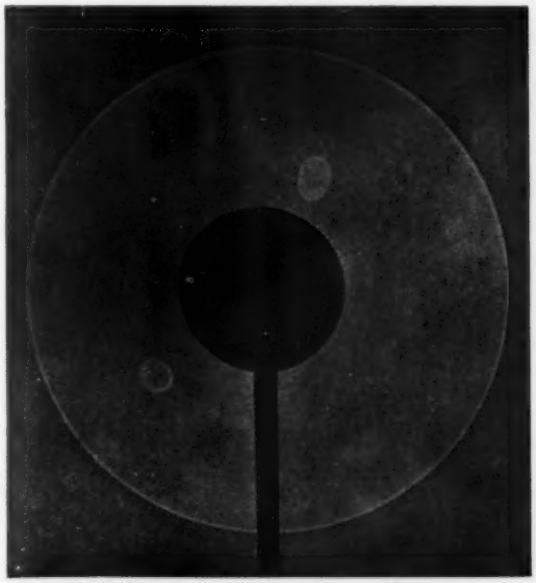

Fig. 1. Sound Impulse generated by the snap of an electric spark

Numerous questions as to the available means of office quieting arose in the construction of two of the new Federal Reserve Bank buildings now nearing completion. Various means of reducing to a minimum the noise from accounting machines, typewriters, coin counters, and telegraph instruments were carefully considered. All the scientific data available as to the relative efficiencies of the various sound absorbing treatment of wall and ceiling surfaces for the reduction of noise had been obtained by experiments conducted with sustained musical tones. As is well known, the sound absorbing properties of materials vary widely with the pitch of the sound, so that the application of these data to the case of office noises involves assumptions as to their pitch characteristics. Analysis of the sound produced by the impact of the type-bar of a typewriter or the click of a telegraph sounder presents considerable experimental difficulty. It seemed better therefore to make a direct study of the absorption co-efficients of materials for these sounds, rather than to attempt to apply the data for sustained tones of definite pitch.

Certain elementary considerations may be helpful for a more thorough understanding of the effect upon the average intensity of sound within a room of introducing sound absorbing materials. If a single click of a typewriter, for example, be produced in the open air, a single pulse of condensation, followed by one of rarefaction is propagated as a spherical shell of sound energy. A photograph of the cross section of the sound pulse produced by an electric spark is shown in Fig. 1.

* *Riverbank Laboratories, Geneva, Ill.*

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The total amount of energy in this shell remains constant as the sound advances. This constant quantity of energy is spread over a constantly increasing surface, so that the energy passing through a given area of the wave front decreases as the distance from the source increases, and we have the well known law of "inverse squares" between the intensity of the sound and the distance of the source. Conditions in a room having walls, floors and ceilings that are perfectly absorbing would

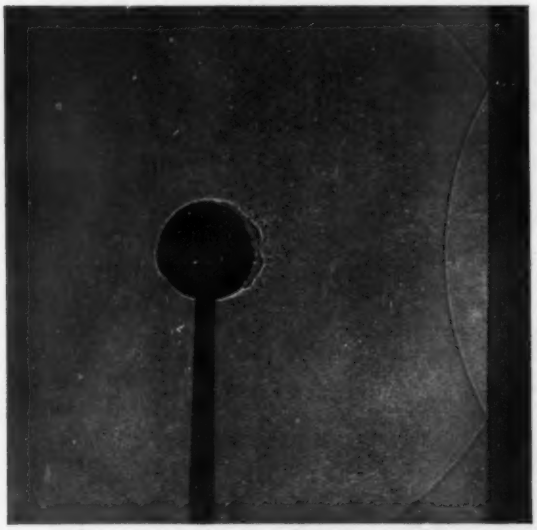

Fig. 2. Reflection at a hard impervious surface

correspond exactly to the out-of-doors condition. In such a room, the loudness of the sound would decrease rapidly as the distance from the source increases, so that with a number of sources of sound, those at a distance would contribute but little to the intensity as observed at any one point in the room. Thus the noise of an operator's own machine, supposed to be two feet from his ear, would be twenty-five times as great as that from his neighbor's machine ten feet away. Hence the noise to which each person in the room would be subjected would be mainly that originating in his immediate neighborhood, and office units of any size could be employed without the intensity of the sound becoming excessive.

The conditions in a room with ordinary surfaces are quite different from those just described. The present experiments indicate that hard plaster walls absorb between two and three per cent. of the sound that is incident upon them, reflecting the rest. In such a room, therefore, the sound from a single typewriter click must undergo a large number of reflections before being wholly absorbed. As an illustration, the time required for the sound from the impact of a telegraph sounder to die away to an intensity that can just be heard in the room in which these experiments were performed was 6.4 seconds. The average number of reflections of sound can be computed from the dimensions and is found to be about 500 in this time in this particular room. Let us suppose that the sounder is being operated at a rate of five impacts per second. At any instant the sound energy in the room is that which is produced at that instant increased by the residue of sound from the thirty-two impacts that were produced in the preceding 6.4 seconds. It can be computed that under these circumstances the average sound energy in the room is something over five times that produced by a single impact. Furthermore, these multiple reflections will tend to equalize the sound intensity throughout the room. Consequently, at any point, sound from a distant source will not be diminished according to the inverse square law, and each source will contribute materially to the noise throughout the room.

The photographs of the sound pulse produced by

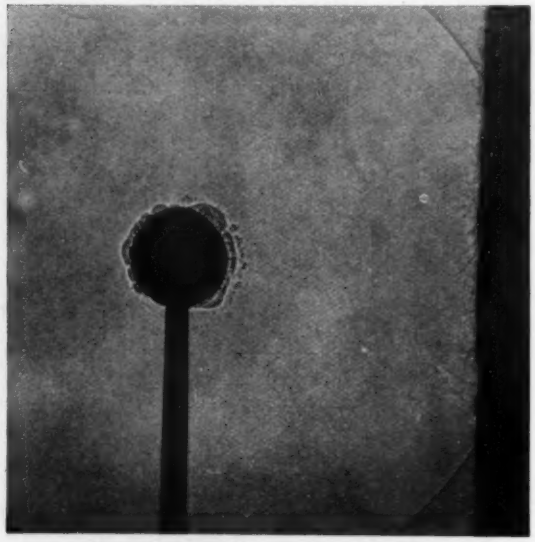

Fig. 3. Reflection at surface of hair felt

the snap of a heavy electric spark, shown in Fig. 1, serve to illustrate the foregoing; Fig. 2 represents the reflection of such a wave from a smooth hard impervious surface. The reflected portion is shown and has a curvature of the same sign and magnitude as though it originated from an apparent source just as far behind the reflecting surface as the real source is in front of it, suggesting the familiar optical analogy of the formation of an image by a plain mirror. In Fig. 3, the same wave is shown, incident upon a surface of hair felt. Comparison of Fig. 2 and Fig. 3 illustrates strikingly the absorption of sound by such a material; the reflected portion of the sound in the latter case is

too small to be photographed. The multiple reflections of the wave produced by a single sound pulse from the highly reflecting walls of a room are illustrated in Fig. 4. The model in which the photograph was taken was 2½ inches square, and the exposure was made about .00033 of a second after the sound was produced. Enlarging the scale to a room 30 x 30 feet, the photograph would illustrate the condition of affairs about 1/20 of a second after the sound is produced. The prolongation of the sound in time and the equalization of intensity throughout the room can be easily understood by picturing the effect of these successive reflections from walls which absorb only one or two per cent. of the energy at each reflection.

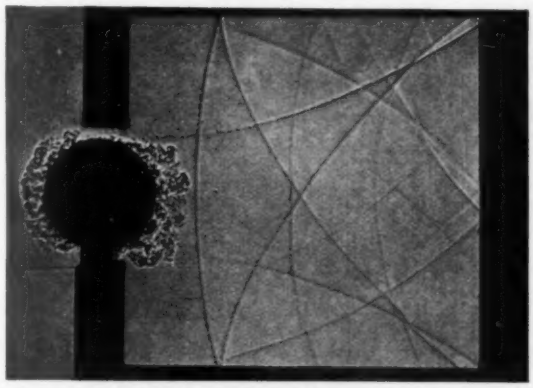

Fig. 4. Multiple reflections within a closed space

It appears then that the ideal conditions for a minimum of noise would be that of perfectly absorbing walls and ceilings. In the present investigation, the purpose was to determine the degree to which various practicable means of wall and ceiling treatment approximate this condition. In the first part of this paper the method of experimentation will be described, and the results obtained will be given in the second part.

The Method

For a detailed treatment of the general method of determining the absorption co-efficients of various surfaces the reader is referred to the Collected Papers of Professor Wallace C. Sabine which have been recently published by the Harvard University Press, Cambridge. Certain modifications of the method and the theory are necessary for the application to impulsive sounds. The terms employed are defined as follows:

E = the total sound energy produced by a single impact.

I = the average sound energy, per unit volume of the room, at any time t seconds after the impact. Call this the average sound intensity.

I_0 = the average intensity immediately after the impact.

A = the time rate at which the average intensity changes.

V = the volume of the room.

a_1, a_2, a_3, etc. the absorption co-efficients, i. e., the fraction of the incident energy absorbed at each reflection by the surfaces whose areas are s_1, s_2, s_3, etc. respectively.

a = the total absorbing power of the room.

s = the total surface exposed to the sound.

$\underline{a}$ = the average absorption co-efficient.

n = the average number of reflections per second.

v = the velocity of sound.

t_1, t_2, t_3, = the duration of audibility under conditions *1, 2, 3,* respectively.

By an analysis very similar to that given in the work just referred to, the equations given below are deduced. Two important points of difference should be noted in the results.

1. In the case of sustained tones, the initial intensity I_0 depends upon the absorbing power of the room as well as upon the rate of emission of sound by the source. For impulsive sounds the average initial intensity is simply the total energy produced, divided by the volume of the room.

2. n, the number of reflections per second is computed from the experimental value of K in Professor Sabine's well known formula, $aT = KV$. The relations that will be found useful are:

$$I_0 = E/V \qquad (1)$$

$$At = \log_e I_0 = \log_e E/V \qquad (2)$$

$$n = vs/4V \qquad (3)$$

$$A = n\underline{a} = na/s = va/4V \qquad (4)$$

Substituting for the value of A in (2) that given in (4), we have

$$at_1 = \frac{4V}{v} \log_e E/V \qquad (5)$$

Equation (5) involves two unknown quantities, namely, a, the absorbing power of the room, and E, the amount of sound energy produced by the source. If either can be experimentally determined the other may be computed by the equation. Thus if a can be experimentally determined for a given room, the right hand member of equation (5) is simply the product of a and the time in seconds that the sound continues audible. We may then find the absorbing power of any object brought into the room by determining the times of reverberation from the same source under the changed conditions. For if a' *and* t'_1 be the absorbing power and the time respectively under

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the new conditions, then

$$at_1 = a't'_1 = k \text{ (a constant)} \quad (6)$$

and the absorbing power of the object is $a' - a$. The method of determining the absorbing power for an impact sound of the Sound Chamber of the Laboratory (described in THE AMERICAN ARCHITECT of July 30, 1919) will be given in detail since it is one that can be employed in any room sufficiently reverberant, for any sound, the intensity of which can be varied in measurable ratios.

For this purpose, an ordinary telegraph sounder was used. The energy of the release stroke is proportional to the tension of the restoring spring. The sounder was modified so that this tension could be varied and its magnitude measured by balancing known weights suspended from a projecting arm on the sounder bar. When this weight is removed, the unbalanced tension of the spring brings the sounder bar against the stop, and the mechanical energy of the impact is proportional to the known weight. The electric current through the magnet coils was broken by means of the stopwatch chronometer. The time during which the sound persists after the stroke can thus be determined to within one fifth of a second, and by making a large number of observations, averaged values which are self-consistent to within a few hundredths of a second may be obtained.

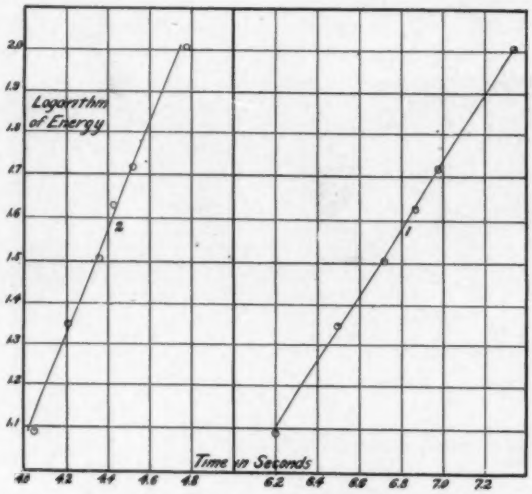

Fig. 5. Graphs showing linear relation between the time of reverberation and the logarithm of the mechanical energy producing the sound. Curve 1 is for the bare room; curve 2 after addition of 4.73 square meters of one inch felt

The first question to be answered is that of the relation between the mechanical energy of the impact and the sound energy which it produces. The Sound Chamber observations fortunately furnish a direct answer to this question. By equation (5), the time of reverberation is proportional to the logarithm of the sound energy. If now, experiment shows that this time is also proportional to the logarithm of the mechanical energy, the proportionality between the mechanical energy and the acoustical energy is established. The results of experiments on this point are presented graphically in Fig. 5. The tension of the restoring spring was adjusted so as to balance successively different weights ranging from 12.4 grams to 102.4 grams. Distances on the horizontal scale represent the times in seconds during which the sound lasts. The vertical scale represents the logarithms of the weights, which are proportional to the energies of the blows. Graph 1 shows the results when the Sound Chamber is in the standard condition. Graph 2 shows the results of bringing 4.73 square meters of felt into the room. In both cases the experimental points lie very close to a straight line, thus establishing quite satisfactorily the proportionality between the energy of the sound produced and that of the impact producing it. The points of Graph 1 represent the mean of a much larger number of observations than do those of Graph 2, but in both cases, the agreement is sufficiently good to justify the statement that the energy of the impact and the sound produced are proportional over the range covered, so that we may take one as a measure of the other.*

* *Strictly speaking, the linear relation between the time of reverberation and the logarithm of the energy of the impact establishes only the fact that the sound energy varies as some power of the impact. In the absence of any theoretical reason for supposing that this power is any other than the first, this assumption is made, and the numerical values deduced in the succeeding paragraph are made upon this assumption.*

(To be continued)

STRUCTURAL DESIGN PROBLEMS*

A discussion of the present importance of the items of restraint, continuity and unbalanced moments

THE bending moment curve may be said to represent, to an exaggerated scale, the position of the neutral axis of a freely supported beam with the maximum possible deflection under the assumed loading. A beam thus deflected is flexible and as its position before loading is horizontal it must be elastic in order to form the curve. The neutral plane in graphical work is consequently dealt with as a flexible and elastic string with the ends fast.

Any vertical intercept between the string and a closing line connecting the supports to which the ends of the string are fast, gives the bending moment at the point on the beam through which the intercept passes. The horizontal line represents the true position of the neutral axis of the beam and the intercept represents the resistance set up to prevent it from assuming the curved form. When a beam on a single span is restrained the closing line merely shifts position so the sum of the areas of negative moment will equal the area of positive moment. With the continuous beam the closing line becomes a broken line with a change of slope at each support. The broken line is the thread of the neutral axis of the beam, the moment curve is the thread of a series of freely supported separate beams and the vertical intercepts are the bending moments. The closing line on each span of a restrained beam begins at the end of the moment curve and goes vertically from that point to the broken line which it follows to the next support where it drops vertically to the other end of the moment curve, forming a closed figure.

ANOTHER graphical treatment of continuous beams is shown in Fig. 6. The proof is given in DuBose's *Graphical Statics* and Church's *Mechanics of Materials.* Spans are plotted as shown with points of support R_1, R_2, etc., and each span is divided into three equal parts by vertical lines *1, 2, 3, 4,* etc. From each even numbered line set off a distance equal to one-third of the adjacent span and draw the vertical lines *A, B,* etc. Note that *A* falls to the right of R_2 because L_2 is longer than L_1; while *B* falls to the left of R_3 because L_3 is shorter than L_2.

When the extreme ends are freely supported lines *1* and *8* are ignored. A straight line is drawn from R_1, in any direction to an intersection with line *A* above the neutral axis *a, b,* of the beam. From the intersection of this line with line *2* at *2,* a straight line is drawn through the point of support, R_2, to an intersection at *3,* with line *3* below the neutral axis.

Through this point *3* on line *3* draw a line upward, with any slope, to intersect line *B* at *4* and downward in an opposite direction to intersect line *A* at *5.* Connect *2* to *5* with a straight line, the point where it crosses the neutral axis being a point of inflection in L_2, marked by a small circle. Connect *1* to *3* with a straight line and thus obtain a point of inflection in L_2. From point *6,* where line *3, 4,* cuts the vertical line *4,* draw a line through the point of support, R_3, to an intersec-

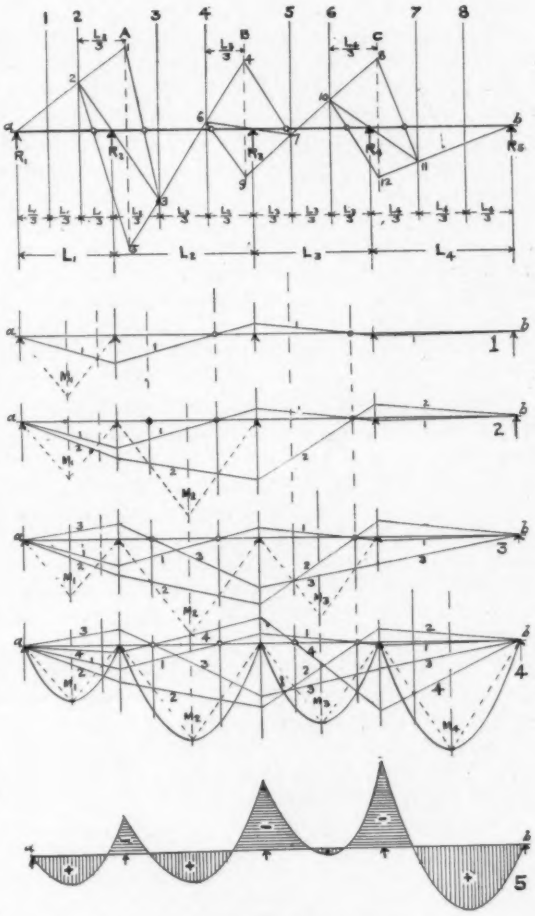

Fig. 6. Conventional Graphical Method for Moments, Shears and Reactions

* *Continued from page* 405, *The American Architect, May* 10, 1922.

tion with the vertical line *5* at *7*. From *7* draw a straight line upward at any slope to intersect line *C* at *8* and downward in an opposite direction to intersect line *B* at *9*.

Draw a straight line from *6* to *9*, thus obtaining the second point of inflection in L_2. Draw a straight line from *4* to *7* to obtain an inflection point in L_3. From point *10*, where line *7*, *8*, crosses the vertical line *6*, draw a line through the point of support, R_4, to an intersection with the vertical line *7* at *11*.

From the end of the beam at support R_5 draw a straight line through *11* to an intersection with vertical line *C* at *12*. Draw a line from *10* to *12* to obtain a second inflection point in L_3. Draw a line from *8* to *11* to obtain an inflection point in L_4.

Dropping to *No. 1* in Fig. 6, lay off the maximum bending moment, M_1, on L_1. Connect it by dotted lines to the points of support. From the inflection point drop a vertical line to intersect the dotted line to the interior support. Draw line *1* from *a* through this intersection to the vertical dropped through the support and from this point continue the closing line as shown to the end support, R_5, at *b*. On all spans except, L_1, moments where the closing line, *1*, is below *a*, *b*, are negative and where the line is above *a*, *b*, they are positive.

Dropping to *No. 2* in Fig. 6, set off the maximum moment on L_2 and draw the dotted lines to points of support. Through the points where verticals from the inflection points intersect the dotted lines draw closing line, *2*, in this span. Closing line *2* is then continued through the other spans as shown until it ends at *a* and *b*. On all the spans except L_2, intercepted moments between this line and line *a*, *b*, are negative when below and positive when above *a*, *b*.

Dropping to *No. 3*, the moment is plotted on L_3, and closing line *3* is drawn, following the method described for L_2.

Dropping to *No. 4*, the moment is plotted on L_4 and closing line *4* is drawn, following the method described for L_1; the other end span.

The complete moment curves are now drawn for each span as shown on *No. 4*, ready for a summation of ordinates so that *No. 5* may be drawn. In L_1, the ordinates from closing line *1* to the moment curve; in L_2, from closing line *2* to the moment curve; in L_3, from closing line *3* to the moment curve; and in L_4, from closing line *4* to the moment curve the moment ordinates are positive. Dividing each span into several divisions by vertical lines and algebraically adding the moment ordinates on these lines data are obtained for the construction of *No. 5*.

When loads are not uniform the maximum moment is measured on a vertical line through the center of gravity of the loads, but this does not change the methods described above. When the last figure is drawn the bending moment curve will not be a parabola but this merely affects the position and magnitude of the final curve of moments.

When the outer end of the first span is restrained, line *a*, *2*, in L_1, Fig. 6, starts from the intersection of vertical line *1* with line *a*, *b*, instead of starting from *a*. When the outer end of the last span is restrained, line *12*, *11*, in L_4 ends at the intersection of vertical line *8* with line *a*, *b*, instead of ending at *b*.

When there are changes in the moment of inertia use artificial spans by dividing the moment of inertia *in inches* by the span *in inches*, using

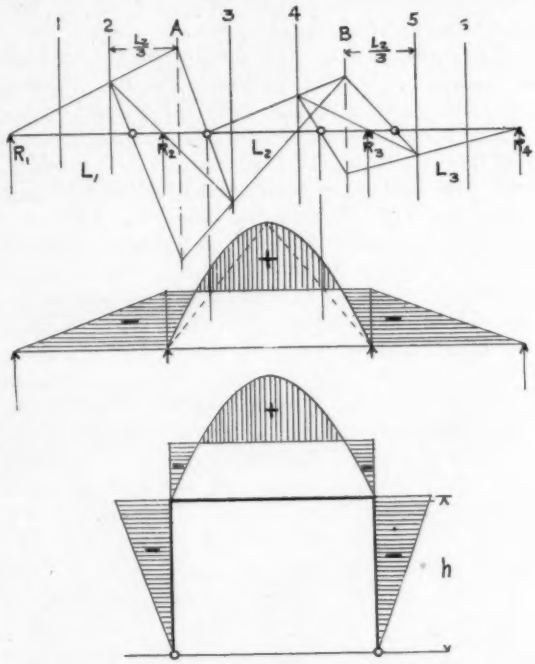

Fig. 7. The Portal Problem with columns hinged at bottom

actual spans and loads in the computation of bending moments.

In Fig. 7 and Fig. 8 the method is shown in its application to ascertaining the stresses in portals. The vertical supports are assumed to be continuous with the girder, forming a continuous beam of three spans. The center span is assumed to be uniformly loaded with no load on the end spans. In Fig. 7 neither column is restrained at the lower end while in Fig. 8 a condition of perfect restraint is assumed. This method was given in an article by F. E. Richart in *Engineering and Contracting*, June 23, 1920, it being one of a series written by W. M. Wilson and F. E. Richart.

It is a comparatively simple matter to design a floor or roof of many spans, by using "ready-to-hand" co-efficients found in building codes or other specifications. Such co-efficients, however, are ap-

plicable only when all the spans are practically equal and are uniformly loaded. The use of simple graphical methods, such as those here shown, gives the designer a picture of the true conditions and often introduces economy in material.

The practice of many designers is to study each floor by constructing two diagrams, one across and the other along the length of the building. In each direction a study is made with all spans fully loaded and also with alternate spans fully loaded, the spans between carrying dead load only.

Unbalanced moments at ends of spans are distributed to columns and to adjoining spans. The distribution is proportionate to the relative moments of inertia of such adjacent members.

The effect of continuity in beams is transmitted to columns and all interior supports, in the form of an additional load. Assuming two equal spans uniformly loaded the total load on the column will be *1.25wl* in which

w = total load in pounds per lineal foot.
l = span in feet.

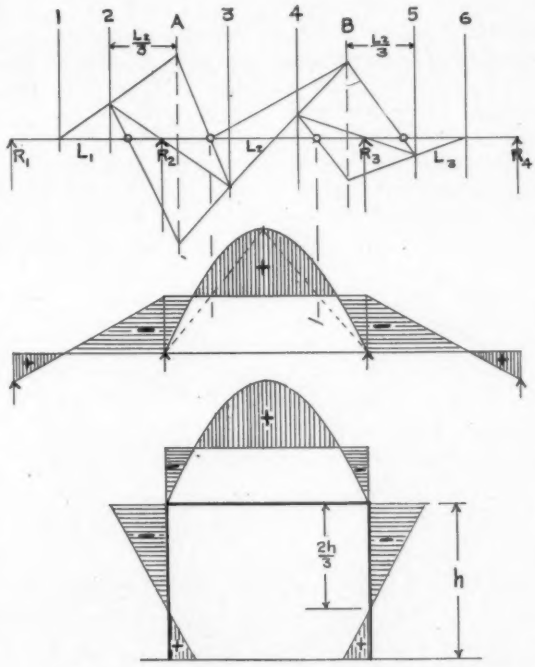

Fig. 8. The Portal Problem with Columns fixed

Assuming three equal spans uniformly loaded the total load on each column will be *1.1wl*. If one end span has no live load and the two other spans are loaded, the column under the two loaded spans will carry a load equal to *1.2wl*.

The co-efficients vary with the ratio of $\frac{\text{dead load}}{\text{total load}}$ and range from 1.0 for interior columns with a ratio of 1, to 1.14 with a ratio of 0 for three or more spans. For the column nearest the wall the co-efficients range from 1.1. for a ratio of 1, to 1.2 for a ratio of 0. The co-efficients are proportionate for intermediate values of the ratio.

These pressures caused by continuity have nothing to do with unbalanced moments; that is, the columns are assumed to have no stiffness and act merely as round-ended non-attached supports.

TESTING CAISSON FOUNDATIONS

An account of how tests were made on foundations in place to determine the carrying capacity and skin friction

ONE of the most important investigations conducted in Chicago recently has been the tests on caisson foundations conducted by the Chicago Union Station Company to determine their supporting power when resting on hardpan; the following account of how the work was done appearing in the April, 1922, *Journal of the Western Society of Engineers, Chicago, Ill.*

At the meeting on March 6 Mr. J. D'Esposito, chief engineer of the Chicago Union Station Company, delivered a paper describing the work that they had done to determine the actual amount of load that could be carried by foundations on the location of the new building which they are now constructing. The plans for the new Union Station were conceived in 1913 and it was contemplated that the building would be of only moderate height and accordingly the foundations were sunk to hardpan, a distance of about sixty-five feet, which would provide ample supporting power to carry a building of that weight. Due to the changing conditions, brought about by the war, it was decided to erect an office structure of about twenty stories and this, of course, greatly increased the load necessary to be carried by the

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foundations. In sinking the caissons for the original station, the company made very careful surveys of the soil and sub-soil conditions and determined conclusively that it would not be necessary to have them extend to bed rock in order to carry a building as then contemplated. Altogether 250 caissons of different sizes were put in, all of them resting on hardpan and calculated to withstand a load of six tons per square foot. To remove these 250 caissons and install new ones extending to bed rock would be enormously expensive and it was therefore decided to conduct a thorough investigation in order to determine whether they could be utilized to carry the heavier building.

Hardpan at this point is found at a depth of about sixty-five feet and is about twenty feet in thickness. The hardpan in turn rests upon a bed of soft material having low supporting power about five feet in thickness and this rests on bed rock. In order to test the foundations two entirely new caissons exactly similar to those in place were installed at a point as close as possible to the new building. The problem of concentrating a sufficient load on the top of the caisson to form any accurate conclusion was a difficult one, and it was solved in the following manner:

A large stack of rails, weighing a great deal more than would be required for the test, was supported on independent foundations at either side, and a specially made hydraulic jack was placed on the top of the caisson so that it would exert its force upward against the bottom of the stack of rails and thus a load which could be accurately measured was transmitted to the foundation under test. The scheme worked perfectly.

The method of conducting the test was to place a certain load on the foundation and keep it constant for a sufficient length of time to determine that there was no more settlement and then it was increased and held constant until it had again produced no further settlement. The load was increased until it was more than eighteen tons per square foot or over three times the calculated amount and held there until the caisson showed that it had permanently come to rest. The total settlement was about one and one-eighth inches, over half of which is accounted for by the compression of the concrete under load. When the load was removed the caisson recovered about one-half an inch of settlement, which is accounted for by the recovery of the concrete.

Two types of caissons were tested, one being a perfectly plain cylinder and the other having a wide or bell-shaped bottom. The results obtained from the two tests checked very closely and showed accurately the supporting power of hardpan.

After completing the above tests, a well was sunk along the side of the wide-bottomed caisson and examination of the concrete at different points showed it to be of the highest quality. A tunnel from the bottom of this well was dug under the bottom of the straight-sided or cylindrical caisson, so that all support from beneath was removed and then a further load was applied on it to determine the supporting power due to skin friction. It was found that the total supporting power due to skin friction for a caisson of this size amounted to 315 tons, which includes the weight of the caisson itself. This is equivalent to 700 pounds per square foot of surface.

In conducting these tests it was not the purpose of the Chicago Union Station Company to determine any new formulae or to attempt to make any changes in engineering practice, but rather to attempt to solve their own problems. The fact is that the results obtained are of great importance to the engineering profession.

Cost Data on a Concrete House

IN Oak Park, Ill., Mr. A. J. R. Curtis of the Portland Cement Association built a home in which the walls are of Hydro-Stone concrete block laid in Portland cement mortar. A complete description appeared in the March, 1922, issue of *Concrete*.

The building is 28 ft. wide by 45 ft. long, two stories high, with hollow walls. The total cost was not stated but the elements of cost were itemized as follows by percentage of the total:

		Per Cent. of Total Cost
1.	Land	15.75
2.	Abstract and title	.35
3.	Architect	4.15
4.	Building permits	.17
5.	Excavating	.55
6.	Hydro-Stone block and concrete art stone	16.55
7.	Mason labor and supplies	7.15
8.	Concrete (floors and walks)	5.30
9.	Carpenter labor	4.30
10.	Rough lumber	5.95
11.	Interior trim	6.15
12.	Stairs	.50
13.	Ornamental iron	.55
14.	Plumbing	4.80
15.	Plastering	2.83
16.	Stucco and carving	.58
17.	Glass and glazing	1.35
18.	Tile and terrazzo	1.55
19.	Sheet metal	.46
20.	Tile roof	...
21.	Composition roof	.40
22.	Electric wiring	2.45
23.	Hardware	1.30
24.	Heating	5.05
25.	Decorating (general)	2.70
26.	Decorating (walls)	1.35
27.	Lighting fixtures	1.45
28.	Linen shades	.44
29.	Screens	.43
30.	Gas extension	.23
31.	General contractor percentage	4.05
32.	Sundry extras	1.16
		100.00

REVIEW OF RECENT ARCHITECTURAL MAGAZINES

BY EGERTON SWARTWOUT, F.A.I.A.

THE April number of *Architecture* has as a frontispiece a photograph of the statue which is entitled Civic Virtue, and which is colloquially known on Park Row as The Rough Guy. There is also published a statement by the sculptor, Mr. Frederick MacMonnies, in which he says that this youth is "*not* trampling, kicking nor stepping upon the ladies," as has been assumed, and that, anyway, they are not ladies but sirens, as anyone can tell from the fish tails, and that these wretched creatures are "trying to snare him with a net," obviously with little success. Mr. MacMonnies says further that he "is blamed for choosing . . . forms of sea monsters to suggest treachery and guile." "I did not invent this," he says, "I have to take things as they are." Can we infer from this that Mr. MacMonnies has actually seen real mermaids, or is he merely relying upon the testimony of such intrepid explorers as Walter E. Traprock or Captain Fitzurse? To those who have criticized the scale of the figure, Mr. MacMonnies says that "to throw back and indulge in the ease of archeology . . . would have been to make the neighborhood as dead as the Roman Forum or St. Paul's Churchyard." There are perhaps many who wish the sculptor had done what he considered the easier thing, the throw back in archeology, and who would prefer the calmness of the Forum or St. Paul's to the riot of Park Row; there are perhaps many who consider the scale and character of the statue entirely out of harmony with the City Hall, for the proper display of which every effort is being made to clear the Park of the unsightly buildings which choke it; there are perhaps many who find the symbolism meaningless and offensive, and who consider that viewed from any angle in the Park or on the street the silhouette is poor and the design confused; there are many who will criticize and some who will praise, but anyway you've got to admit it's a very large statue.

From "Architecture"

"Civic Virtue"
Frederick MacMonnies, Sculptor

Henry S. Churchill has an article on Three Basque Towns with some interesting photographs, particularly one of the courtyard of Onate University; and there is a good, simple bank at Watertown, Mass., by Dennison & Hirons, and a sympathetic article on Charles Cressent, a cabinet maker of the Regency, by Henry Coleman May. William Pitkin finds that there is Profit from a Profitless Year. Some of the profits he mentions are perhaps not very evident to most of us, but there is one profit which is a real profit indeed, and that is the profit that comes from the enforced presence of the architect in his own drafting room. In the last year and for several years in fact, many architects have turned draftsmen, and it has done them and their work much good.

* * *

In *The Architectural Forum,* April, William Roger Greeley writes of the Fourth Dimension in Schoolhouse Design, and illustrates it with some of the recent work of his firm. What Mr. Greeley has to say is good, practical common sense, particularly when he points out the dangers of over-standardization, and the fact that most standards are minimum standards. Another good point is the suggestion that the plan be made more elastic, so that the class rooms can be differently sub-divided, to provide for

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the growth of the school or for changes in the method of instruction. And he also alludes to the vital necessity for getting a little more imagination and a little more architecture into the schools; the elimination of the packing box type, and the study of each school as a separate problem, and the relation of site to the design and to the plan. It is to be hoped that many school boards may read Mr. Greeley's article. Costen Fitzgibbon continues his article on Baroque, Justice and Common Sense, and points out "the prevalence of noble and monumental scale; complete symmetrical conception of comprehensive and connected schemes of composition, in contrast to the more or less fortuitous and piecemeal methods that often obtained at an earlier epoch; the high value attached to the dramatic element; the elaboration of plan forms and the advance in garden design." The article is well worth reading and the illustrations are good. The greater part of the *Forum* is devoted to the Domestic Architecture of Henry Corwith Dangler, a title which seems a little misleading, as it is repeatedly called to the attention of the reader that the houses illustrated are designed by David Adler and Henry Dangler. However that may be, the houses themselves are good, the plans extremely simple and cleverly worked out, the detail excellent and the interiors charming. Two of the city houses are somewhat marred by the introduction of a roof story over the balustrade, the roof story being too conspicuous and having the appearance of being a later and unfortunate addition, but the quality of the whole exhibit is high. Howard Moise has some interesting drawings of Alsation Iron Work of the 18th Century which are well presented, and there are some good photographs of furniture in an article by Walter F. Wheeler.

From "The Architectural Review," London

Study for Panel—St. Ambrose Training His Choir at Milan
By Frank Brangwyn, R. A.

The April number of *The Architectural Review*, London, is an extremely good number, even for The Architectural Review. Always well gotten up, well printed and with excellent illustrations, this magazine is not only attractive to the eye but contains much that is valuable for future reference. The opening article is on the Mural Decorations at Christ's Hospital, Horsham, by Frank Brangwyn, R. A., illustrated by eight full page reproductions, two of which are in color. Mr. Brangwyn's work is too well known in this country to call for extended comment; his color, draftsmanship and composition have given him a position second to none, and the panels here exhibited are up to his usual high standard. Some of the studies are particularly interesting examples of draftsmanship, and we take pleasure in reproducing one of them. The panels, sixteen in number, are in the Chapel of Christ's Hospital, which is better known as the Blue Coat School and are about fifteen feet from the floor, "and," says the article, "run around the walls in a bold pattern of blues, old gold and warm grey. The dominant note is blue, the blue of the sky." The article goes on to say that these canvases are not directly affixed to plastered walls, but are mounted on stretchers

From "The Architectural Record"

Cottage at Tadworth, Surrey, England
L. Stanley Crosbie, Architect

over the brick walls, a method of doubtful permanency for paintings of this size. The Review continues its series of articles on the smaller English country towns and in this number gives some interesting views of old work in Burford, some quaint shops, almshouses and a curious building called The Tolsey. H. Elrington writes of the Lombard Churches of Rome, the illustrations of which are familiar but good; and there are published six drawings by Frank L. Emanuel,

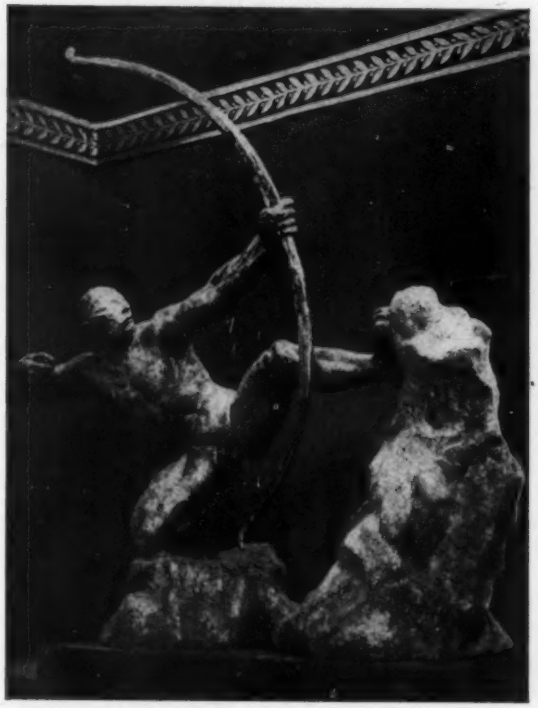
From "The Architects' Journal"

Le Centaure Mourant
Antoine Bourdelle, Sculptor

under the general title of Disappearing London. Mr. Emanuel's work is, or should be, as well known in this country as that of Otto Eggers or Vernon Howe Bailey, and is very remarkable in character. The pen drawing published is not as good as the pencil sketches, two of which "Hercules Road, Lambeth" and "Back of St. Bartholomew's Church, Smithfield" are beautifully handled. One of the best of the set, a charcoal drawing called "The Portico of the Old General Post Office," reproduced on page 452, is extremely clever and brilliant. There is also an excellent memorial tablet to the late Phillip C. Thicknesse, an architect. The tablet is in white alabaster, very well composed, and was designed by Harold A. Dod, A. R. I. B. A.

The Architects' Journal, London, April 5. H. Bartle-Cox is quite sure that Antoine Bourdelle is a great French sculptor and to prove it exhibits as a frontispiece a photograph of Le Centaure Mourant. We never saw a centaur die, but we have our doubts whether he ever does it standing up, as M. Bourdelle seems to think he does. To be sure "mourant" sometimes means languishing, so maybe he is not dying at all, but only languishing, although it *does* look as if someone had wrung his neck, and we must say we don't blame him. Mr. Bartle-Cox, however, seems to like a little more action. "Repose in art," says he, "is very nice for tired brains, but rapidity and agitation is the spirit of the times," and so another, so-called L'Héraclès Archer, is published as an example of dynamic vigor. One naturally thinks of Hercules as a Greek, but not our artist: he is too modern for that, and has selected as a model what appears to be an acrobatic but feeble-minded Jugo Slav. "But," says Mr. Cox, "Monsieur A. Le Chatelier (Professeur au Collége de France) of whom Monsieur Bourdelle has made a portrait bust, writes a eulogistic appreciation of this statue in the publication *La Vie.*" Oh well, he got the bust, didn't he? There is an appreciative article on the work of G. Gilbert Scott, who has just been elected a Royal Academician; and an interesting view of

From "The Architects' Journal"



L' Héraclès Archer
Antoine Bourdelle, Sculptor

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his uncompleted Liverpool Cathedral, and a very originally treated Catholic church at Ramsey, Isle of Man.

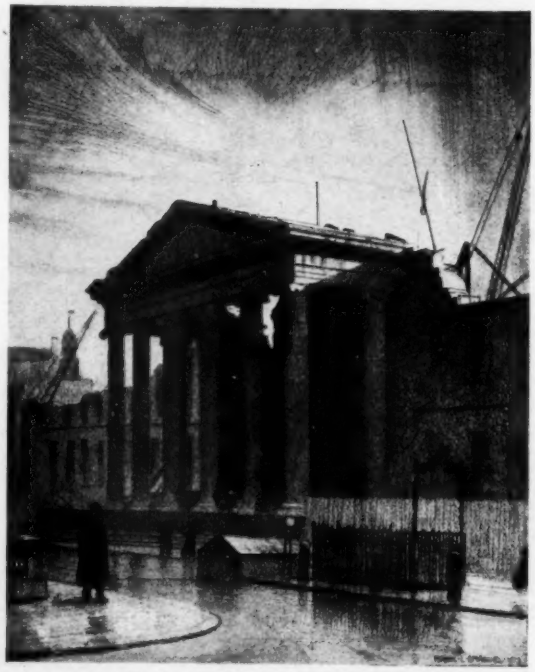
In a review of an address before the Architectural Association by Mr. Gilbert Bayes, occurs the following: "Once sculpture was sunk in symbolism, such as Charity giving alms to Poverty, but restrained by Prudence, as Mr. Arthur Rackham had once put it." In the same number, under date of April 12, there is an account of the paper read by Mr. Stanley C. Ramsey, F. R. I. B. A. on London Clubs, which is interesting and the illustrations well worth preserving. The Reform Club, here illustrated, designed by Sir Charles Barry in 1837 is perhaps one of the best.

The Architectural Record, April. Leon V. Solon continues his series of articles on Architectural Polychromy, and in this number brings out two points—that as actual gradation of color was impossible, a color gradation was obtained by concave or convex modelling of surfaces; and, second, that in the interest of color harmony the colors were outlined and separated from each other by uncolored spaces or by bands of contrasting color. As to the first point there is no question that a considerable effect of color gradation is obtained by the surface modelling; but that the surface modelling was done solely to obtain this result, as Mr. Solon suggests, is quite another story. That the design and detail of Greek architecture was influenced by color to some extent is probable; that is to say, the Greeks probably always conceived their design as being colored; the triglyphs were always blue to them and the metopes red and so on; but their ornament was modelled first, and colored afterwards. The Anthemion illustrated in Plate IV would have the same play of light and shade in uncolored marble. The second point is well taken. Mr. Solon's illustrations are excellent and numerous. It is a pity they couldn't all be in full color, but the expense was doubtless prohibitive; in any event it is to be hoped that these articles will be published in book form.

From "The Architects' Journal"

The Reform Club, Pall Mall
Sir Charles Barry, Architect

From "The Architectural Review," London



The Portico of the old General Post Office

Harold D. Eberlein has another article on another Italian Villa near Florence, the photographs being good and rather unusual in character; and there is published a charming little cottage in Surrey by L. Stanley Crosbie, which is reproduced on page 450. Horace W. Peaslee writes of Zoological Gardens in an interesting way and gives very good advice to any one who might have a chance to design a Zoo, but as problems in Zoo design are rare the article loses somewhat of its educational value.

Journal of the American Institute of Architects, April. Isn't it simply *wonderful* to be up-to-date

in everything one does? In the choice of words, if you get what I mean. And our little group of serious thinkers are quite up to date, as the following quotation from Shadows and Straws will show: "In the race to thwart men by threatening them with the law, registration seems the best gesture that architects can make." "Every night," says Hermione, "I ask myself, have I made a gesture today, or have I failed?"

Frederick Lee Ackerman has an article on the Building of Manhattan, illustrated with ærial views of New York, which are most convincing, and are much more effective in proving his points than any other form of illustration could be. Mr. Burt L. Fenner writes of Skilled Mechanics in the Building Trades, and the development of the apprenticeship system in which his committee is now doing pioneer work in New York. There is probably no architect, certainly no busy architect, who has given so unselfishly of his time and experience for the advancement of public and professional matters, as has Mr. Fenner.

A committee of the Illinois Chapter is anxious to restore, or rather to have someone else restore, the old Fine Arts Building of the World's Fair of '93, and they think among other things that "it would be a good place for the display of unusual drop curtains of artistic merit from the theatre or opera company that otherwise might be destroyed." We are in doubt whether it is the theatre or the opera company which otherwise is doomed to destruction; perhaps it is a covert allusion to Mary Garden: but if there is to be a restoration of the old Fine Arts Building, why not rebuild it according to the designs of the original architect, Monsieur Bénard?

In the Book Review Mr. Charles H. Whitaker gives an excellent review of the book Ad Quadratum, published under the auspices of the Norwegian Government. Mr. Whitaker says: "Mr. Frederik Macody Lund has applied certain geometrical theories to the cathedral of Nidaros, Trondhjem, Norway. Apparently they are considered so important that his work has been published by order of the Norwegian Government, which leaves us exactly where we were before. The façades of Nidaros and of other well known churches are overlaid with a series of straight and curved lines purporting to prove Mr. Lund's conclusions. If they are proof then all is over, of course, but in the drawing of these lines the author seems to have had a curiously childlike predilection for making them begin and end at points exceptionally favorable to his own conclusions. Also, he seems totally to have ignored the long process of trial and error, of experiment, of patching and altering, by which most of the mediæval churches attained structural solidity. There are eighty-seven ways more or less of making an architect. We would suggest trying the other eighty-six first."

Detail, Lower Stories, Municipal Building, New York
McKim, Mead & White, Architects

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HOUSE OF THOMAS NEWBOLD, ESQ., NEW YORK

McKIM, MEAD & WHITE, ARCHITECTS

ARCHITECTURAL DRAUGHTSMANSHIP*

BY PROFESSOR WILLIAM ROTHENSTEIN, M.A.

Principal of the Royal College of Art

THE only time I had the honor of being a guest at this noble Institute, we were looking over the architectural drawings, discussing them informally, and, as always happens in life, the professional artist, who is supposed to like vague and romantic things was drawn to the severest drawings, while the architect was attracted by the looser painter-like things. So the suggestion was made that we might discuss this together, and here I am, in front of a rather frightening audience. And the curious thing is that, as a practicing painter finding oneself among architects, one realizes how very little we know about one another. There are many new things in the modern world of Art, and this is one of them; that painting and architecture were closely united in the past, is a truism. I do not even know whether the views which a humble painter holds on architects' drawings will be sympathetic to you; whether you share these views, or whether you will disagree. Perhaps one of the main points I might come to at once is this—I did touch upon it at the beginning—that I think there is a misconception among a great number of architects as to what a painter-like drawing, or a draughtsman's drawing, really is. And it is odd it should be so today, because the new orientation in the graphic arts is towards an almost mathematical severity. Those dreadful people whom we call the younger men, whom one of your members, with an unusual lapse of psychology in a distinguished architect and scholar, and himself a fine draughtsman, accused of being "washy" in their work, can more justly be accused of idealizing the machine. Through their intellectual admiration for the hieratic art of the past they have been trying, often absurdly, to reduce æsthetic formulas to something like mathematical precision. Sir Reginald Blomfield, a very old and delightful friend of mine, accused these young people of sloppiness. You, as architects, should understand and sympathize with this curious mental attitude which is characteristic of a good deal of European painting and sculpture at this moment. Even some of us older artists are a little envious of your use of the T-square; we would like our lines to be as precise and swift as yours. And when we turn to your drawings, hoping to find support from your precision, we find that you are inclined to neglect your own precious inheritance and to turn to something which we do not recognize as belonging to the true spirit of our own particular age. Now in your building you must of necessity be influenced by precisely the same spirit that inspires contemporary musicians, philosophers, men of science, and artists. We are all approaching the same reality from different angles. And if a great number of modern architectural draughtsmen do not know the more intelligent aims of their colleagues in art, it shows that there is something a little wrong. Each age inherits as a legacy an instrument ready to its hand, and we use any other instrument at our peril. Good taste will never make up for a sincere use of contemporary material, and no study of the past, no preference for one æsthetic principle which a past age has practiced to perfection, will make up for our failure to use fruitfully the instrument we are born to work with. Whatever the fashion of our day may be, it is the natural outcome of all that has gone before. We are sometimes accused of being too eclectic and derivative; yet I find in a great number of modern architects' elevations—because, of course, I am not dealing with plans—a lack of the scholarship which is characteristic of the best art of any period; they miss precisely those elements of severity and austerity, sensitiveness to proportion and balance of rhythm, which I would have thought were the very qualities which architects would have understood better than any other artists. So in going round these drawings it happens that the nearer the elevations approach to the plan, the more I find myself in sympathy with them; and the more artistic in intention the more alien do they appear. It seems to be rather a paradox that a man brought up without any architectural training should hold these views. And I may mention that a good number of the best artists I have known were first educated as architects, and their art has in consequence gained because they had the advantage of that severe training which gave them knowledge of construction and respect for a T-square, and it is a training I, personally, bitterly regret having missed. And you who have had this education, when you handle our common instruments, pencil and brush, should bring to bear upon it the particular qualities which are your birthright.

I believe that your clients often require from you elevations and perspective drawings which appear to most of them more human and comprehensible than your plans. Now when, in anticipation of my promise, I came to your admirable library recently to consult English, French, Italian

* *An address given before the Royal Institute of British Architects.*

and German architectural magazines, I looked with a new interest at the elevations of modern European buildings. The closer these elevations approached your plans, the better did they appear to me to be, but in the more pictorial perspective drawings the influence of the work of those we accept as true artists was less noticeable than the fascination exercised by the more trivial and insincere painters. This surely should not be the case. We pay homage to great art, not with our lips alone, but through our work. We who practice the arts know the rare combination of qualities required to form a great artist, whether he be sculptor, painter or architect. When we become aware of someone whose vision and handiwork can survive the acute and fresh judgment of a succeeding age we may fairly expect some influence will have made itself felt upon their own age by sensitive contemporaries, and at least that later men will be actively conscious of it. Now architectural drawing has one thing in common with great painting—it is by its nature severe in statement and purpose; one would suppose architects quick to appreciate the severer elements in contemporary art, for instance. If, then, you propose to bring pictorial qualities into your work, I put it to you that it might be worth your while to understand the more scholarly and the austerer elements in modern painting and sculpture. I was surprised to find even so admirable an artist as Norman Shaw putting trees and bits of landscape into very severe and beautiful architectural elevations, which would scarcely appear to a student of art to be drawn by a contemporary of Watts, Burne-Jones or William Morris. A tree is as full of form as a roof or a buttress. We are all students; we have the Italian art of the past to tell us, if we have not time to go to nature, what design and form mean. And I should have thought that when you drew a clear and precise elevation and wished to put in landscape surroundings, you would do this in a way which showed a sympathetic formality.

When an architect has faith in the traditions of his own great pursuit and keeps to the instruments which furnish the drawing desk, he achieves something very like the qualities of the great painters. With T-square and compasses he achieves the beautiful swift line, the kind of line every draughtsman wants to get on his paper, the line we see in the drawings of Ingres and Alfred Stevens. It seems to me a puzzling thing that this noble inheritance which architects have, should be replaced by a trivial amateurishness. But we all, at one time or another, miss the way and go wandering after strange goddesses. Least of all can members of my profession throw stones.

But if I may be allowed to speak especially to the youngest members in the room, may I suggest that they inform themselves what truths the most vital philosophers, poets and men of science are pursuing. For we are all children of the same age, and to find the truth we are ourselves hunting approached from a different angle is often heartening and inspiring. Last of all, perhaps you will discover what painters are thinking about, with what ideas of form they are occupied. And if you can allow yourselves to be influenced by contemporary work which contains true quality and distinction, your own drawings may gain in weight and authority.

Of your plans I am offering no criticism: I am speaking only of elevations. When these are drawn simply and with severity, these elevations seem to me often impressive works of art. When the draughtsman is wanting in faith in the beauty of straight mouldings and of well pointed stones or bricks, in "the straight allure of simple things," in fact has no faith in the vitality of his own building, and consequently wishes to give it a picturesque appearance, he is apt to wander from the straight path. Perhaps the artist's love for the picturesque has misled him. I admit there is something extraordinary touching in quoins and coping, cut and laid down by once busy human hands, and some element of this feeling one hopes will creep into the work of one's own hand. The appeal which old buildings make to the artist's spirit may come from the fact, or fancy, that nature adopts man's handiwork, making it, when it has been sound enough to endure, appear her own. Hence to draw buildings carelessly seems a slight upon both man's work and nature's.

Some of the most beautiful drawings I have seen have been made by architects in their sketch-books, and certain painter friends of mine who have had the good fortune to begin their training in architects' offices, not only draw buildings with an especial sensitiveness, but show deep appreciation of architectural beauties.

Nothing gives one greater æsthetic pleasure than the just proportions and mass of a building, whether it be a cathedral or a barn, perfectly adjusted to the earth on which it appears to have grown. All the forces of nature, gravity, wind and storm, and the radiance of the sun, seem to have endowed it with almost superhuman qualities; a ship with her sails spread, seems only to evoke a similar perfection.

You young architects, then, who have greater knowledge of building than any painters can have, might well think it worth your while to study the severer ideals of the painter's and draughtsman's art which might well form the basis of your own elevations.

There is nothing I dislike more than using the past to belabor the present; it is an irritating and disheartening habit of debate. But we can learn one thing from earlier periods of art—when men are deeply absorbed by the visible world they have faith in every manifestation of life, and are not interested in decay. The architecture of Bot-

ticelli or of Crivelli is what people today would think the architecture of the railway station and the post office, with the pointing freshly laid. There is an evident pleasure in clean carving and ironwork. Today there appears to be an idea that the only excuse for being interested in buildings is that these shall be crooked and weather-stained.

If painters believe this, architects should know better. And in drawing your attention to the drawings of the earlier architects, I think you will discover that their elevations were singularly like the buildings depicted by the painters, and that up to the time of Canaletto, painters and architects drew in the same manner.

The Derrick
War Scenes in Wooden Ship Yards — Shaw Fund prize 1920
From the Aquatint by Frederick K. Detwiller

XUM

BUILDING IN SOUND

ABT VOGLER never reared a palace of music fairer than that which was built before the eyes of members of the Architectural Association recently states *The Architects' Journal,* London. The occasion was a "lecture on 'Building in Sound' illustrated at the piano," but Mr. Frank Hutchens, who is professor at the Sydney Conservatoire of Music, gave his audience a treat such as lecture-goers seldom enjoy.

A few pertinent, albeit delightfully informal, remarks on the inter-relationship of the arts introduced a wealth of musical explanation and illustration, and a succession of familiar works was endowed with new and wider meanings, and one or two less-known pieces added a spice of delicious unexpectedness to the feast.

Music, said Mr. Hutchens, was a mental stimulus, and knowledge of it could not but be useful, but there was a lamentable lack of intelligence in the attitude of the sister arts. The laws of architecture were clear and concise, those of music were intangible, but many terms—form, harmony, rhythm, balance—were common to both. All art is a discovery capable of no explanation apart from reason; but, whatever may be its expression, it is inspired by the same fundamental spirit. Form, for instance, so obvious in building, was only gradually unfolded panoramawise in music; but it was there nevertheless, and in both arts form and balance were essential to enable work to stand the test of time.

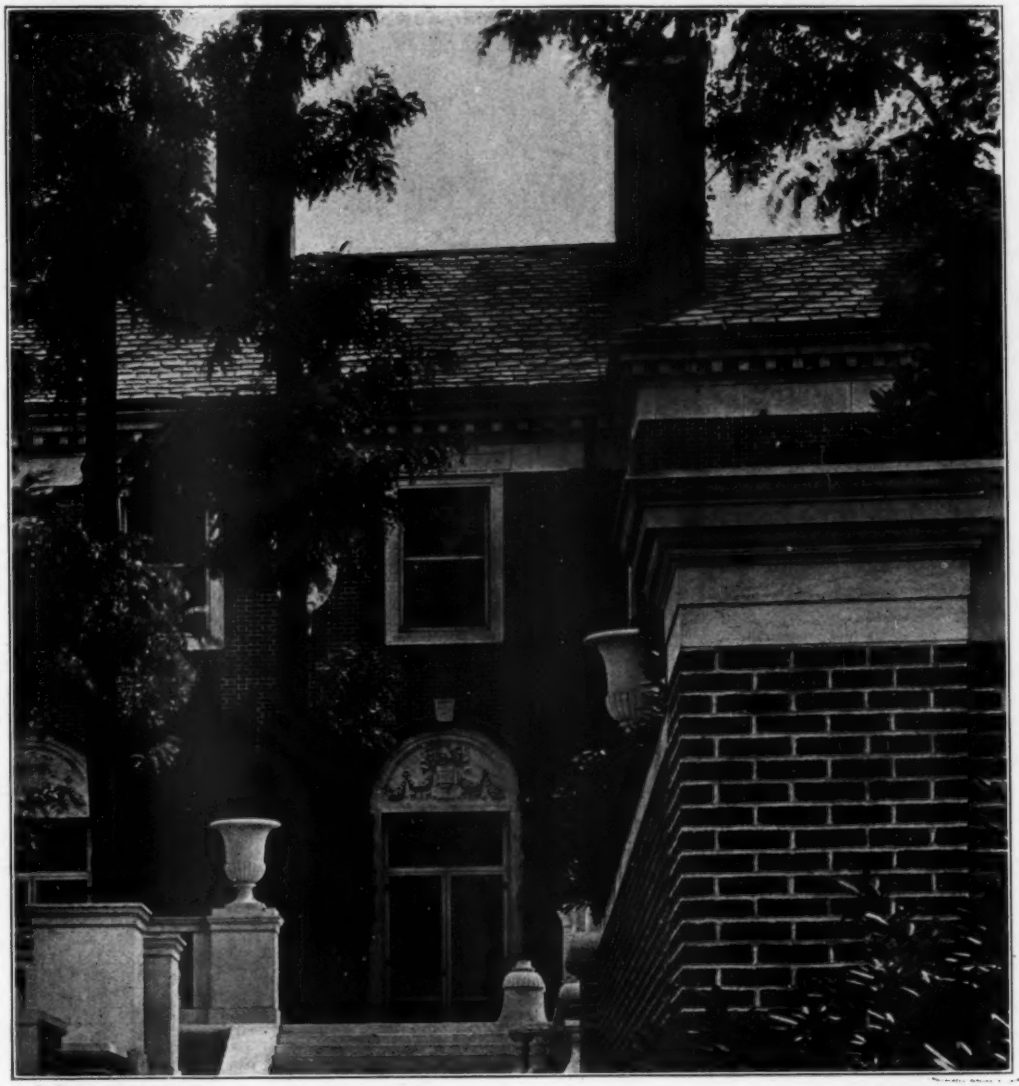
Dwelling on the importance of contrast, Mr. Hutchens played some Beethoven extracts, aptly illustrating the dramatic value of the element of surprise, and of the greatest effect of all—silence. From Beethoven and Chopin also he demonstrated the sweet uses of harmony, which he described as a form of decoration. Simple themes, he said, delicately varied, rest the ear even as harmonious architectural embellishments refresh the eye. There was all the difference, however, between the charm of successful variations and the detestable affectation of art which was extraordinary for the sake of extraordinariness, clever for the sake of being clever.

A little Hindu song of Rimsky-Korsakoff's afforded convincing illustration of the hypnotic influence of even rhythm, and dazed audience, shaking itself into sufficient wakefulness to clamor for more, may possibly have wondered whether an ordered reiteration of forms in the designs of their creation would produce the same effect on passersby.

Passing on to the vexed question of realism, the lecturer pointed out that the artist sees the inward reality of a thing, and does not attempt a literal portrayal of its outward features. Rather, he seeks to arouse the same emotion by his own methods. Ravel and Debussy had achieved amazingly successful aquatic effects, and a Scriabin Nocturne afforded a fine example of the classical method, with its contrast in tone and subtly thought-out note values.

The art of illusion came into music not less than into architecture, and Mr. Hutchens instanced the feeling of size and progress given by a swift alternation of high and low, of large and small.

Chopin, Liszt, and an entrancing little cradle song by, we believe, a Finnish composer, brought the recital to a triumphant conclusion. Words and music alike gave infinite food for thought. Mr. Hutchens did not press his points or labor his analogies. He just showed what musical expression of fundamental laws could accomplish. Architecture is merely a different medium: when will it regain the power of producing the same effect, arousing similar emotion? That may come. At the present day one is tempted to re-echo the conclusion of Browning's "Abbé": "The rest may reason and welcome: 'tis we musicians know."



A. I. Dupont Residence, Roslyn, L. I.

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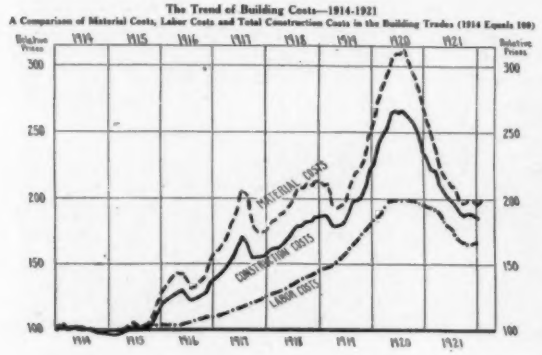
XUM

The Trend of Building Costs

IN the *Chemical Bulletin,* March, 1922, issued by The Chemical National Bank of New York, the following discussion of building costs appeared:

The trend of general commodity prices was upward between 1896 and 1920, and building costs followed the general course. Until 1915 the increase was gradual, with short downward swings during the years 1904, 1908, 1911 and 1914. The year 1915 witnessed the beginning of a more rapid rise, and the rate was still further accelerated in 1919 and early 1920. The latter year was the turning point, and the downward rush of prices equalled the rise of the preceding year, continuing for twelve months before any definite slackening of the fall occurred.

The chart portrays the course of general construction costs in all classes of buildings, and one of the two chief items entering into those costs, between 1914 and 1922. The three curves on the chart are based upon weighted index numbers of building material costs, building labor costs, and a combination of the two. The average costs during 1914 are taken to equal 100 in each case.



General Construction Costs

It is apparent that the increase in construction costs between 1915 and 1917 was almost entirely due to the increase in material prices. These had doubled by the summer of 1917, while building labor costs had increased 18%. The increase in labor costs continued, constituting a more important factor in later additions to construction costs. In 1920 labor costs had reached a maximum, 100% above the 1914 average. Material costs, at the same date, were 212% above the 1914 average. At this peak which was reached in August, 1920, construction costs were 167% above pre-war costs. The precipitate decline in material costs brought general construction costs down in the latter part of 1920, though labor costs maintained their level during that year. The year 1921 brought recessions in both groups, and by February, 1922, material costs stood 98% above their pre-war average, with labor costs 65% above. The weighted average of the two, which is taken to represent the general cost of construction, was 85% above the 1914 figure in February, 1922.

It is worthy of note that there have been no marked changes in material costs or in general construction costs since September, 1921, though there have been slight recessions in labor costs. Certain building materials have actually increased in price during the last several months. This has been due to renewed bidding for materials with the increased building activity of recent months.

National Conference on City Planning

THE fourteenth annual meeting of the National Conference on City Planning will be held at Springfield, Mass., June 5, 6 and 7.

This meeting will be in conjunction with the convention of the Massachusetts Federation of Planning Boards and at the invitation of the Mayor of Springfield, the City Planning Board and the Springfield Chamber of Commerce.

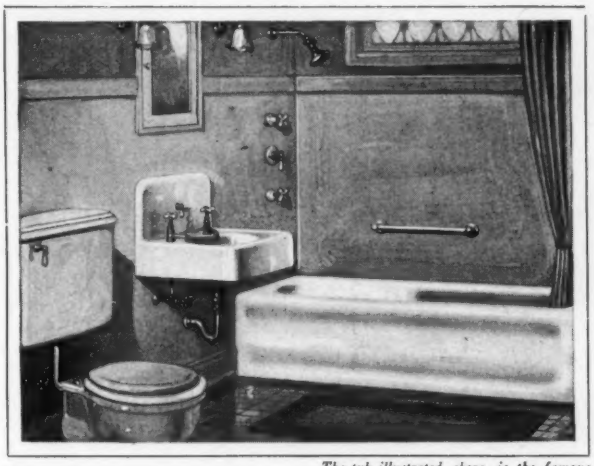
The program as arranged for the three days' sessions is one of unusual importance. Papers will be read by prominent men engaged in city planning, who will also participate in the debates that will be held.

A Correction

DUE to erroneous information received in connection with the LeBrun Traveling Scholarship Competition, it was stated in our issue of April 12, that this scholarship was established by Michel LeBrun in 1910. We are informed by Julian Clarence Levi, chairman of the LeBrun Scholarship Committee, that this is incorrect, this scholarship having been founded by Pierre L. LeBrun.

A Design Competition

THE Victor Parting Bead Company, of Reading, Pa., desiring to secure designs of most artistic merit for screen doors and entrances, announces a design competition, open to all competitors. The competition will close on June 30. For further particulars address the Victor Parting Bead Company, Reading, Pa.



The tub illustrated above is the famous Kohler "Viceroy" Built-in Bath with shower

THE "VICEROY"—THE POPULAR BATHTUB

"Who can pay tribute properly to the American bathroom?" recently wrote Cecil Roberts, an Englishman, in *Collier's Weekly*. "What the Parthenon was to the Greek, so is the bathroom to the American. In this temple of the god of cleanliness he is at his best."

Probably the "VICEROY," the popular built-in bathtub, originated by Kohler, has done more to make the modern bathroom the glittering white, attractive spot that it is than anything else.

Surely it has become the accepted tub, the ideal tub, to folk who take a pride in their bathrooms.

There is professional pride in specifying the "VICEROY" built-in tub just as there is in specifying any of the Kohler Enameled Plumbing Ware.

Kohler means genuine value—durability, a pure white enamel that retains its fine immaculate beauty permanently.

The "VICEROY" is cast in one piece. It is built into the wall and floor. It is without joints or crevices to collect grime and dirt.

The durability, the beauty of Kohler Ware have earned its installation in prominent hotels, public institutions, clubs, apartments and in countless thousands of homes modest and pretentious.

Every piece of Kohler Ware is exclusively distinguished for (1) the beautiful, snowy whiteness of its durable enamel, (2) the uniformity of this whiteness in every fixture, (3) the name "Kohler" in dainty blue letters inconspicuously but permanently fused into the enamel, for your protection.

Send for illustrated booklet, "KOHLER of KOHLER," describing Kohler bathtubs, lavatories, kitchen sinks and laundry trays.

ONE THOUSAND, SEVEN HUNDRED AND SEVENTY-FIVE KOHLER "VICEROY" Built-in baths were installed in the Hotel Pennsylvania, New York, McKim, Mead & White, Architects.

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"The American Plan" as Established by The Industrial Association of San Francisco

By H. B. Allen
Secretary, Industrial Association of San Francisco

THE general public may be interested in learning that the American Plan as established and enforced in San Francisco by the Industrial Association is something distinct and different from the old time, so-called open shop. Whereas the open shop wherever enforced usually has meant the entire absence of all restriction or restraint upon employers with respect to wages paid, hours of work and other conditions of employment, thereby giving opportunity for unscrupulous employers to deal unfairly, the American Plan in San Francisco has set up machinery for reasonable control of these matters in the interest of the public.

In other words, it really has been a *plan,* definitely conceived and definitely carried out, in the interest not of any special group or faction, but in the interest of the three parties to industrial relations: the public, labor and the employers.

The American Plan is predicated upon the proposition that the public interest is paramount to that of any other community element, and that neither labor nor capital, nor any other faction or class, should be allowed to take action that will jeopardize that interest. And, as the public interest actually would be jeopardized as much by unfairness of any kind visited by the employers upon labor or consumers, as by autocratic labor union control of industry, the American Plan prevents either of these things taking place.

The American Plan says to labor: "You cannot be allowed to secure an autocratic, selfish and restrictive control over industry, for the result is that not only the industry itself but the whole public is seriously injured thereby." It says to the employer: "You cannot be permitted to beat down labor, for when labor receives less than that to which it is justly entitled, not only labor but the whole public suffers seriously and is permanently injured—and we will not give you such unlimited backing that you can enter into combinations with your competitors and get a monopolistic control in your industry under cover of a community-wide organization."

Then, turning again to labor, it says: "You are entitled to an equitable wage, to reasonable hours and to decent working conditions, but in turn you must be willing to give to your employers, honest, loyal and efficient service." And turning once more to the employer, it says: "You have the right to demand honest, loyal and efficient service from *all* your employees. You are entitled to the right of hiring and discharging employees individually on merit, without outside interference, so long as on all occasions that right is exercised only upon broad principles of justice; and to the right of rewarding individual merit in employees, but in turn you must recognize the obligation of the management to the employees generally, and particularly to co-operate in providing, so far as possible, continuous employment."

Roughly, and in brief, that *is* the American Plan as established and enforced in the building industry of San Francisco by the Industrial Association. Theoretically fair, it stands proven as practically fair as well. It has freed labor from the self-imposed but misconceived restraint of selfish leadership, has emancipated employers from the throttling control of labor unions, and has guaranteed to the public, to labor and to the employer that all their legitimate rights will be protected at all times.

W. F. Paris Elected Member of Societe des Gens de Lettres

THE election of William Francklyn Paris, architectural decorator and art connoisseur of New York, to membership in the Societe des Gens de Lettres is reported from Paris.

Mr. Paris is author of "The Decorative Elements of Architecture," and is an honorary fellow for life in the Metropolitan Museum of Art. He is a lecturer on art and decoration at Cornell, Vassar and the Universities of Pennsylvania and Maryland. His best known decorative work is that of the loggia and ceiling of the Detroit Public Library.

Isaac Broome, Pioneer Ceramic Sculptor, Dies

ISAAC BROOME, eighty-six years old, noted as a ceramic sculptor, the oldest academician of the Philadelphia Academy of Fine Arts, and an international figure in ceramic art circles, died recently at the home of his daughter in Trenton.

Mr. Broome was United States commissioner and representative of New Jersey as commissioner of ceramics to the Paris Exposition in 1878. His sculpture is included in works of art in the Capitol at Washington and in various places throughout the country. He executed a statue for the W. W. Corcoran Mausoleum at Georgetown. He also was an inventor. He wrote and lectured on art and educational subjects.

Light pink Speckled Terra Cotta; Ornament in polychrome

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American Science to Have Home in Washington

C. L. WALCOTT, president of the National Academy of Sciences, has recently announced that a large building to cost in the neighborhood of $1,300,000 is to be erected in Washington, D. C., to be used as a center for American science. The building will be the home of the National Academy of Sciences and the National Research Council. In it investigators from all parts of the country and abroad may be brought together for counsel and co-operation.

The building, a gift of the Carnegie Corporation of New York City, will face the Lincoln Memorial and will have a frontage of 260 feet. The ground was bought at a cost of about $200,000 through private donations. Bertram Grosvenor Goodhue of New York City is the architect.

Architectural League Elects New Officers

AT the recently held annual meeting of The Architectural League of New York, at the Fine Arts Building, the following officers were elected: President, Howard Greenley; first vice-president, Henry McCartam; second vice-president, Arthur Covey; treasurer, Leon Solon; secretary, Russell Whitehead.

Where to Find Information About Zoning

THE Department of Commerce, in response to the needs of over 60 cities in which zoning is in effect, and of over 110 cities which have zoning ordinances in preparation, has just issued A Selected Bibliography of Zoning. This contains critical references to the most important articles on the subject which have appeared in periodicals and books. Special sections are devoted to the arguments for and against zoning, to the legal aspects of zoning, and to such technical matters as the relation of city planning to zoning, the different types of districts, and agencies and administration for zoning.

The bibliography may be obtained by application to the Division of Building and Housing, Department of Commerce, Washington, D. C.

Pennsylvania State Association

AT the recent annual meeting of the Pennsylvania State Association of Architects, the following officers were elected: President, W. L. Plack, Philadelphia; vice-president, S. F. Heckert, Pittsburgh; secretary, Percy Ash, Philadelphia; treasurer, G. W. Stickle, Erie.

The Philadelphia Sesqui-Centennial Exposition

IN the preliminary account of the proposed Sesqui-Centennial Exposition in Philadelphia in the May 10 issue of THE AMERICAN ARCHITECT, the illustration of the Art Museum was attributed as to authorship to Paul P. Cret. This building was designed by Messrs. Horace Trumbauer, C. L. Borie and C. C. Zantzinger, architects.

All of the drawings, with the exception of the proposed plan, accompanying Mr. Ziegler's article, are the work of M. Jacques Greber.

Academy of Design Students Win Three Chaloner Prizes

THREE students of the National Academy of Design were announced winners of the eighth and last monthly art competition for prizes given by the John Armstrong Chaloner Prize Foundation for the season 1921-1922. The concourse was held recently at the academy. The awards were:

First prize to Maxwell B. Starr; second prize to Alfred Floegel; third prize to Edith Bell.

John F. Holmer, of Cincinnati, it was announced at the same time, will receive the Chaloner American scholarship, amounting to $400 and a year's tuition in an American art school.

National Council of Architectural Registration Boards

THE second regular meeting of the National Council of Architectural Registration Boards will be held in Chicago, Illinois, on June 6, 1922, at the Chicago Beach Hotel, at 7:00 p. m. There will probably be adjourned meetings held at other times during or after the American Institute of Architects' Convention as the business of the Council may require.

The attention of the members of the Council is called to the fact that the Association of Collegiate Schools of Architecture will hold its annual meeting at the Chicago Beach Hotel on June 6, 1922, and that the members of this Council are invited to attend the meetings of this Association. It is quite probable that a joint session of the Council and the Association of Collegiate Schools of Architecture may be arranged at some time during the sessions of the Convention; therefore, all members of the Council are urged to arrange their affairs so as to arrive in Chicago not later than the morning of June 6, and to register with the Council's secretary as soon as they arrive so that they may be informed of any special arrangement of program.

The modern door vanishes

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PERSONALS

Andrew J. Thomas, architect, announces that he has moved his office to 15 East 47th Street, New York City.

Ross Love Henderson, architect, announces the removal of his office to 312-14 Capitol Theatre Building, Detroit, Mich.

Neil J. Convery and Maynard O. Klemmt wish to announce that their office is now located at 942 Broad Street, Newark, N. J.

Herman M. Sohn, architect, announces the removal of his offices to the Winfield Building, 469 Fifth Avenue, New York City.

Frederick A. Davis, Jr., landscape architect, has opened an office at 185 Church Street, New Haven, Conn., where he is engaged in the practice of his profession.

Arthur C. Runzler has opened an office for the practice of architecture at 144 Oneida Street, Milwaukee, Wis. Manufacturers are requested to send literature and samples.

Sam H. Coile and Leland Cardwell have formed a partnership for the practice of architecture under the firm name of Coile & Cardwell, with offices in Johnson City, Tenn.

Edgar W. Maybury is now an associate member of the firm of Sylvanus B. Marston and Garrett B. Van Pelt, Jr., architects, Chamber of Commerce Building, Pasadena, Cal.

Kenneth MacDonald, Jr. and Maurice C. Comchot announce their establishment as architects, engineers and managers of construction, with offices at 234 Pine Street, San Francisco, Cal.

J. Hunter McDonnell and Howard B. Peare announce the establishment of a partnership for the general practice of architecture under the firm name of McDonnell & Peare, at 101 Park Avenue, New York City. Manufacturers' catalogs and samples are requested.

Announcement is made that the Todd Architectural Company, Red Oak, Iowa, intends to make a specialty of bank designing. and would appreciate receiving manufacturers' catalogs and literature relating thereto.

Eugene C. Wachendorff, architect, announces the removal of his office to 620 Forsyth Building, Forsyth Street, Atlanta, Ga.

Announcement is made that Byron E. Porter, architect, has opened an office for the practice of architecture at 1119 Tremont Building, Boston, Mass. Manufacturers' samples and catalogs are desired.

Cary C. Neff and Ralph J. Kelly have organized a firm for architectural practice under the name of the Canton Architectural Company, their offices being located in the Ellis Building, Canton, Ill.

Gerald M. Baker, engineer and architect, has opened an office at 3438 Oxford Avenue, Maplewood, St. Louis, Mo. Manufacturers' catalogs and samples are desired; data on specification writing would also be of value.

W. C. Knighton and L. D. Howell have formed a partnership for the practice of architecture under the firm name of Knighton & Howell. Their offices will be located in the U. S. National Bank Building, Portland, Ore.

Oscar T. Lang, Arnold I. Raugland and Carroll E. Lewis have opened an office for the practice of architecture and engineering under the firm name of Lang, Raugland & Lewis, at 627 Metropolitan Bank Building, Minneapolis, Minn.

It is announced that R. G. Hanford, formerly of the architectural firm of Esselstyn, Murphy and Hanford, of Detroit, has joined in partnership with Harold M. Bush, mechanical engineer, for practice at 681 East Broad Street, Columbus, Ohio.

Francis E. Dunlap wishes to announce that he has opened an office for the practice of architecture in Room 409, Willoughby Building, Michigan Avenue and Madison Street, Chicago, Ill., where he will be pleased to receive manufacturers' catalogs and samples.

Robert Whitten announces that he has opened offices at 4614 Prospect Avenue, Cleveland, Ohio, for professional practice in general city planning and city zoning. Mr. Whitten will be associated with A. D. Taylor, landscape architect and town planner, and will have the assistance of his thoroughly equipped technical and engineering organization.

XUM

CAMPANILE OF GIOTTO, FLORENCE